Apollo's Lyre
Greek Music and Music Theory in Antiquity and the Middle Ages

Ancient Greek music and music theory has fascinated scholars for centuries not only because of its intrinsic interest as a part of ancient Greek culture but also because the Greeks' grand concept of music has continued to stimulate musical imaginations to the present day. Unlike earlier treatments of the subject, *Apollo's Lyre* is aimed principally at the reader interested in the musical typologies, the musical instruments, and especially the historical development of music theory and its transmission through the Middle Ages.

The basic method and scope of the study are set out in a preliminary chapter, followed by two chapters concentrating on the role of music in Greek society, musical typology, organology, and performance practice. The next chapters are devoted to the music theory itself, as it developed in three stages: in the treatises of Aristoxenus and the *Sectio canonis*; during the period of revival in the second century C.E.; and in late antiquity. Each theorist and treatise is considered separately but always within the context of the emerging traditions. The theory provides a remarkably complete and coherent system for explaining and analyzing musical phenomena, and a great deal of its conceptual framework, as well as much of its terminology, was borrowed and adapted by medieval Latin, Byzantine, and Arabic music theorists, a legacy reviewed in the final chapter. Transcriptions and analyses of some of the more complete pieces of Greek music preserved on papyrus or stone, or in manuscript, are integrated with a consideration of the musicopoetic types themselves. The book concludes with a comprehensive bibliography for the field, updating and expanding the author's earlier *Bibliography of Sources for the Study of Ancient Greek Music.*

Thomas J. Mathiesen is David H. Jacobs Distinguished Professor of Music and Director of the Center for the History of Music Theory and Literature at Indiana University.

Publications of the
Center for the History of Music Theory
and Literature

Thomas J. Mathiesen,
Director
Indiana University

volume 2

APOLLO’S
LYRE

GREEK MUSIC AND MUSIC THEORY IN ANTIQUITY AND THE MIDDLE AGES

Thomas J. Mathiesen

University of Nebraska Press
Lincoln and London

© 1999 by the University of Nebraska Press
All rights reserved
Manufactured in the United States of America
∞

Library of Congress Cataloging-in-Publication Data
Mathiesen, Thomas J.
Apollo's Lyre : Greek music and music theory in antiquity and the Middle Ages / Thomas J. Mathiesen.
p. cm. — (Publications of the Center for the History of Music Theory and Literature : v. 2)
Includes bibliographical references (p.) and indexes.
ISBN -8032-3079-6 (cloth : alk. paper)
1. Music, Greek and Roman—History and criticism. 2. Music—Theory—To 500. 3. Music—Theory—500–1400. I. Title. II. Series.
ML160.M428 2000 99-35248
780'.938—dc21 CIP

Uxori carissimae sacrum

περίφρον Πηνελόπεια
……
περίεσσι γυναικῶν
εἶδός τε μέγεθός τε ἰδὲ φρένας ἔνδον ἐίσας.

Odyssey 18.245–249

BLANK PAGE

Contents

Preface ... xi

I. Introduction ... 1
  Overview and Sources ... 6
    Literature ... 7
    Graphic and Plastic Art ... 11
    Archaeological Remains ... 12
    Notated Musical Compositions ... 12
  Methodology ... 13

II. Musical Life in Ancient Greece ... 23
  Music and Melos ... 23
  Types of Music and Their Function ... 29
    Music for the Gods ... 29
      Hymn ... 29
      Paean ... 36
      Nomos ... 58
      Dithyramb ... 71
      Prosodion ... 81
      Partheneia ... 83
      Hyporcheme ... 88
    Music in the Theatre ... 94
    Music for the Mortals ... 125
      Hymenaios and epithalamion ... 126
      Threnody ... 131
      Epinikion and encomium ... 135
      Skolion and sillos ... 141
      Miscellaneous types, military music, and folk song ... 151

III. Musical Instruments ... 159
  Idiophones and Membranophones ... 162
    Krotala ... 163
    Kroupezai or Kroupala ... 166

- Kumbala or Krembala 170
- Seistron and Rhombos 172
- Rhoptron and Tumpana 173

Aerophones 176
- Aulos 177
  - Origin and history 178
  - Construction and types 182
  - Reeds 198
  - Reconstruction and performance practice 204
- Syrinx 222
- Hydraulis 225
- Salpinx and Horn 230

Chordophones 234
- Origin, History, and Types 235
- Lyres 237
  - Chelys 237
    - Construction 238
    - Tuning and the number of strings 243
    - Performance practice and the plectrum 247
    - Social function 248
  - Barbitos 249
  - Phorminx 253
  - Kithara 258
- Psalteria 270
  - Psalterion and epigoneion 270
  - Magadis, pektis, and phoenix 272
  - Trigonon and sambuke 275
  - The Apulian instrument 280
  - The pandoura and skindapsos 283

IV. Music Theory I: The Sources, Aristoxenus, and the *Sectio canonis* 287

Overview of the Sources 291

Aristoxenus 294
- *Harmonica* 295
  - *De principiis* 300
  - *Elementa harmonica* 319

    Rhythmica 334
  The *Sectio Canonis* 344
V. Music Theory II: The Revival 355
  Plutarch 355
  Cleonides 366
  Nicomachus of Gerasa 390
    Manuale harmonices 393
    Manuale harmonicum 406
  Theon of Smyrna 412
  Claudius Ptolemy 429
VI. Music Theory III: Late Antiquity 497
  Gaudentius 498
  Porphyrius 509
  Aristides Quintilianus 521
  Bacchius 583
  Alypius 593
VII. The Tradition in the Middle Ages 609
Bibliography 669
Index of Names........ 785
Index of Places and Subjects........ 795

BLANK PAGE

Preface

Ancient Greek music and music theory has fascinated scholars for centuries, as the vast quantity of literature published since the fifteenth century readily attests. But why should this be so? Unlike the other art forms of ancient Greece, the actual sounds of ancient Greek music are forever lost. All that remains are a few notated compositions—most of which are many centuries younger than the Greece of Plato and Aristotle, Sophocles and Euripides—and a very small number of archaeological fragments of musical instruments. Nevertheless, none of the other ancient Greek art forms was held in such high esteem by the ancients themselves, whose painters and sculptors never tired of showing the Greeks making music, and none could claim such exceptional powers as were commonly attributed to music by the poets, playwrights, and philosophers, in whose work music and musical matters are employed for literary purposes, described, or treated as a subject of technical or scientific inquiry. Surely, then, the task of recovering this lost art and all that pertained to it was worth the effort, as it seemed to early generations of scholars, and there can be little question that they were motivated by the goal of discovering a kind of musical philosopher's stone. As more and more material was published and studied, later generations began to discover in it useful models for the development of their own theories of music, aesthetics, musical forms, musical psychology, and so on. Thus, the study of ancient Greek music and music theory developed not only because of its intrinsic interest as a part of ancient Greek culture but also because the Greeks' grand concept of music has continued to stimulate musical imaginations to the present day.

A number of monographs on ancient Greek music have been published over the years, including several since 1990. The reader might therefore reasonably wonder why another is needed. In response, I can only say that the present volume reflects the method and perspective of a musicologist, aimed principally at the reader interested in the musical typologies, the musical instruments, and especially the historical development of music theory and its transmission through the Middle Ages. By contrast, the treatments by Martin West, Warren Anderson, and most recently John G. Landels were written from the perspective of the classicist; their interests, assumptions, aims, concentration, critical perspective, and conclusions are fundamentally different from mine. While I do not agree with all their conclusions, I certainly recommend their works to the interested reader. No single discipline or method can claim sole authority in this field.

Apollo's Lyre has had a long and somewhat fitful gestation. I first outlined it in 1979 and sent the outline in 1981 to Dr. Willis Regier, then Associate Editor at the University of Nebraska Press, marking the beginning of a productive association with him of more than fourteen years' duration as he subsequently became Editor-in-Chief and then Director of the Press. Later in 1981, the Press accepted the book for publication, and I projected its completion for sometime in 1986, by which time I had expected to see two prior commitments—a translation of the treatise of Aristides Quintilianus and my *catalogue raisonné* of Greek manuscripts for the Répertoire International des Sources Musicales (RISM)—through to publication. Such was not to be. Aristides Quintilianus was published in 1983, but as I worked on the catalogue, it grew ever larger as I found more and more manuscripts, each of which had to be separately described. Eventually though, the work was completed, and the catalogue was published in 1988.

Meanwhile, Dr. Regier and I decided to establish at the University of Nebraska Press a new series of critical texts with facing-page translations. This new series, Greek and Latin Music Theory, was launched under my editorial direction in 1982, with the first two volumes published in 1984. Over the next ten years, ten volumes were published. Much of the 1980s was devoted to all these projects, but along the way, I continued to gather material for *Apollo's Lyre*, and it gradually began to take shape.

In 1990, I was awarded a Guggenheim Fellowship to work on *Apollo's Lyre*. For the first time, I was able to devote nearly my full attention to the book. The first three chapters and most of the fourth were completed during this year, and I anticipated completing the rest of the book within the following year. Once again, however, unanticipated projects intervened.

In late 1989 and early 1990, a group of scholars began discussing the possibility of forming a full-text database of the entire corpus of Latin music theory, ranging from the *De musica* of Augustine through the sixteenth century, discussions that eventually led to the establishment of the *Thesaurus Musicarum Latinarum* (TML), with the project center under my direction at Indiana University and associated centers at Louisiana State University, Ohio State University, Princeton University, the University of Colorado–Boulder, and the University of Nebraska–Lincoln. During the first couple of years, the TML grew rather slowly, but in 1992 and 1994, the project received two generous grants from the National Endowment for the Humanities, and by the end of 1998, the TML included nearly five million words of text accompanied by more than four thousand graphics, all fully searchable and available to scholars free of charge worldwide on the Internet. This project, together with work on the new editions of the *New Grove Dictionary of Music and Musicians* and *Strunk's Source Readings in Music History*, had to take precedence, it seemed to me, and *Apollo's Lyre* accordingly languished for a time with only four of its strings.

Over the last two and a half years, with other commitments largely fulfilled, I was at last able to turn most of my attention to this book. The first four chapters were completely revised and three more were added: *Apollo's Lyre* now has its full complement of seven strings, in which I hope readers will find a harmonious presentation of the endlessly fascinating subject of ancient Greek music and music theory.

Throughout the long gestation of this book, the University of Nebraska Press has remained patient and supportive. It is therefore a special pleasure to acknowledge in the first place its former and long-time Director, Dr. Willis Regier (now Director of the University of Illinois Press), without whose vision and enthusiasm over the years, neither this book nor the many others with which I have been involved at the Press would ever have seen the light of day. My long association with him has been a great privilege and pleasure.

I should also like to take this opportunity to acknowledge the many who have been unfailingly generous with their advice, assistance, correction, and encouragement, especially my friends and colleagues at Indiana University, Professor Malcolm H. Brown, Professor George J. Buelow, Dr. John W. Clower, and Dr. Andreas Giger; and at other universities, Dr. André Barbera (St. John's University), Professor Calvin Bower (University of Notre Dame), Professor Edward N. O'Neil (University of Southern California), Professor Claude V. Palisca (Yale University), and Professor Jon Solomon (University of Arizona).

I remain very grateful to the John Simon Guggenheim Memorial Foundation for my Fellowship in 1990, during which the first part of this book was written.

For advice and assistance in acquiring the illustrations for this book, I am very much indebted to two further friends and colleagues: Professor Steven Bule and Professor Martha Maas. In addition, I am most grateful to the following institutions and individuals for granting me permission to reproduce the various illustrations of works of art and artifacts that appear on the following pages: Brussels, Musées Royaux d'Art et d'Histoire (Mrs. Viviane Xhignesse); Copenhagen, National Museum, Department of Classical and Near Eastern Antiquities (Mrs. Bodil Bundgaard Rasmussen); Essen, Ruhrlandmuseum (Dr. Charlotte Trümpler); Frankfurt am Main, Städtische Galerie Liebieghaus (Brigitte Gaebe); London, British Museum; Munich, Staatliche Antikensammlungen und Glyptothek (Dr. F. W. Hamdorf); Naples, Soprintendenza Archeologica delle Province di Napoli e Caserta (Stefano de Caro); New York, Metropolitan Museum of Art; New York, Art Resource (Diana Reeve); Paris, Bibliothèque Nationale; Paris, Musée du Louvre, Département des Antiquités Grecques, Etrusques et Romaines (Brigitte Tailliez); Schwerin, Staatliches Museum, Kunstsammlungen, Schlösser und Gärten (Dr. Karin Möller); Taranto, Soprintendenza Archeologica della Puglia-Taranto (Dr. Giuseppe Andreassi); and Würzburg, Martin von Wagner Museum (Dr. Irma Wehgartner).

Finally, I could never adequately acknowledge or express the enormous debt I owe to my wife, Penelope, for her assistance in countless ways (including the preparation of yet another index to one of my books), her selfless patience and ability to dispel every worry and discouragement, and her invariably sensible advice.

She has been and always will be my inspiration, and this book is lovingly dedicated to her.

It is a pleasure to share with all these individuals and institutions whatever praise may be due this book. I reserve to myself, of course, whatever errors and inadequacies may be perceived here, which I nevertheless hope, following the model of Aristides Quintilianus, will stimulate others to improve upon my efforts and "lay down complete in one treatment the things that pertain to music."

Thomas J. Mathiesen
April, 1999

BLANK PAGE

I

Introduction

Vitruvius, one of the most learned men of his day in architecture, town planning, and the various associated sciences, was also a student of ancient Greek music theory—especially the tradition known as "harmonics." This was a trying subject, even for a polymath of the first century B.C.E., as his remarkable treatise *De architectura* reveals: "Harmonics is an obscure and difficult musical subject, particularly for those who do not know Greek letters."[1] Vitruvius was writing about a music theory still current in his own time, and there would be others after him who would write extended treatments, until the music and its theory were largely forgotten in the fifth and sixth centuries of the present era. All of these writers recognized the "difficulty" of this subject, even though it was not remote from their own time.

When the Renaissance humanists began to rediscover the forgotten cultural treasures of antiquity,[2] they were intrigued by the legendary powers and quality of the music of ancient Greece, but they were frustrated by the special difficulties that presented themselves in recapturing the music of an earlier time. Sculpture, architecture, and literature all exist in tangible and more or less permanent form. But music, as a sounding medium, is evanescent. It can be described, it can be made the subject of theory, but it remains elusive. The humanists were also hampered by an absence of notated pieces of music, incomplete or imperfect manuscripts of texts they wished to read, and only a limited knowledge of other valuable pieces of evidence, iconographic and archaeological. Still, they worked at their studies with great intensity, experiencing some illumination but also considerable frustration with this "obscure and difficult musical subject." One of the most learned of these musically inclined humanists, Girolamo Mei, wrote to his mentor Piero Vettori, on 21 February 1562: "I had to turn completely around more than twice in trying to find out the truth for myself. I swear to you that I have passed more than ten nights without sleeping because of these trifles."[3]

---

[1] "Harmonica autem est musica litteratura obscura et difficilis, maxime quidem quibus graecae litterae non sunt notae." *De architectura* 5.4.1. The treatise was written sometime in the first century B.C.E. Unless otherwise noted, all translations are mine.

[2] Forgotten at least in the West. Byzantine and Arabic scholars, however, had continued to study this material in an almost unbroken line. See chapter 7.

In the seventeenth and eighteenth centuries, more and more of the theoretical and literary sources that speak of ancient Greek music began to appear and be widely circulated in published form. Perhaps the most important of these publications was Marcus Meibom's *Antiquae musicae auctores septem,* an edition of seven Greek treatises with parallel translations in Latin, a book of some 800 pages published in 1652 when Meibom was only twenty-two years old.[4] Meibom's edition complemented Athanasius Kircher's famous *Musurgia universalis,* published in 1650, and both of these influenced John Wallis's 1682 and 1699 editions of two treatises Meibom had not included in his collection: the *Harmonica* of

---

[3] "... ho creduto più di due volte aver a girare nel voler rinvenirne il vero, e vi giuro che delle notte più di dieci ho passate senza sonno intorno a queste taccole." The letter is preserved in London, British Library, Additional 10268, ff. 224r–225r. See Donatella Restani, *L'Itinerario di Girolamo Mei dalla «poetica» alla musica, con un' appendice di testi* (Firenze: Olschki, 1990), 178–81; and Claude V. Palisca, *Girolamo Mei, Letters on Ancient and Modern Music to Vincenzo Galilei and Giovanni Bardi,* Musicological Studies and Documents, no. 3 (n.p.: American Institute of Musicology, 1960), 180–82, where the transcription differs in a few details. This quotation and that of Vitruvius were drawn to my attention by Claude V. Palisca, "Introductory Notes on the Historiography of the Greek Modes," *Journal of Musicology* 3 (1984): 221.

[4] *Antiquae musicae auctores septem, Graece et Latine,* Marcus Meibomius restituit ac notis explicavit, 2 vols. (Amsterdam: Elzevir, 1652). The collection includes the *Sectio canonis* (attributed to Euclid) and the treatises of Aristoxenus, Cleonides (attributed to Euclid), Nicomachus, Alypius, Gaudentius, Bacchius, and Aristides Quintilianus, as well as Book IX of Martianus Capella's *De nuptiis Philologiae et Mercurii.* A reprint is available as volume 51 in the series Monuments of Music and Music Literature in Facsimile, second series (New York: Broude Bros., 1977).

Claudius Ptolemy and Porphyrius's commentary.[5] These substantial and highly technical publications provided eighteenth-century scholars with a wealth of material that, on the one hand, appealed to their antiquarian and historical interests and, on the other hand, offered rallying points for arguments about the purpose and meaning of music. Lorenz Christoph Mizler and Johann Mattheson, for example, drew on ostensibly divergent trends in the Greek sources to bolster their own aesthetic differences, while historians such as F. W. Marpurg, G. B. Martini, and Sir John Hawkins tried to develop coherent historical surveys.[6] To some, however, the work of these centuries seemed only to add to the obscurity and difficulty of the subject. At the beginning of the nineteenth century, Raphael Georg Kiesewetter would write in his *Geschichte der europäisch-abendländischen oder unserer heutigen Musik*: "The ancient Greek music may be described as having died in its infancy, a lovely child indeed, but incapable of reaching maturity; and so far as mankind was concerned, its decay was not a loss to be deplored."[7]

---

[5] Athanasius Kircher, S.J., *Musurgia universalis*, 2 vols. (Romae, ex typographia hæredum Francisci Corbelletti, 1650). John Wallis, ed., *ΚΛΑΥΔΙΟΥ ΠΤΟΛΕΜΑΙΟΥ ΑΡΜΟΝΙΚΩΝ ΒΙΒΛΙΑ Γ. Ex codd. MSS. undecim, nunc primum Graece editus* (Oxonii, e Theatro Sheldoniano, 1682); reprinted with a Latin translation in Wallis's *Operum mathematicorum*, 3 vols. (Oxoniae, e Theatro Sheldoniano, 1699), 3:i–xii, 1–152. This latter publication also includes (3:185–355) his text and translation for Porphyrius: "Πορφυρίου εἴς τὰ ἁρμονικὰ Πτολεμαίου ὑπόμνημα. Nunc primum ex codd. mss. (Graece et Latine) editus."

In addition to the several sections devoted to Greek notation and Greek theory, the *Musurgia* (1:541–42) contains the famous forgery of the music for Pindar's *Pythian* 1.1–8, as a "musicae veteris specimen." See Egert Pöhlmann, *Denkmäler altgriechischer Musik*, Erlanger Beiträge zur Sprach- und Kunstwissenschaft, vol. 31 (Nürnberg: Hans Carl, 1970), 47–49.

[6] Mattheson allied himself with the progressives by using the pseudonym "Aristoxenus the Younger" in his *Phthongologia systematica* (Hamburg: Martini, 1748). On the conflict between Mattheson and Mizler, see Lukas Richter, "'Psellus' Treatise on Music' in Mizler's 'Bibliothek,'" in *Studies in Eastern Chant*, vol. 2, ed. Miloš Velimirović (London: Oxford University Press, 1971), 112–28. Major sections on ancient Greek music appear in Marpurg's *Kritische Einleitung in die Geschichte und Lehrsätze der alten und neuen Musik* (Berlin: G. A. Lange, 1759); Martini's *Storia della musica*, 3 vols. (Bologna: Lelio della Volpe, 1757–81); and Hawkins's *A General History of the Science and Practice of Music*, 5 vols. (London: T. Payne and Son, 1776).

[7] "Die altgriechische Musik starb in ihrer Kindheit; ein liebenswürdiges Kind, aber unfähig je zur Reife zu gelangen. Für die Menschheit war ihr Unter-

In the nineteenth and twentieth centuries, still greater control of the literary sources was accomplished, and a fair amount of actual music notated on stone and papyrus and in manuscripts began to be discovered.[8] Two of these pieces are extended paeans to Apollo, leader of the Muses and patron of music. In the first, an anonymous composition dating from the late second century B.C.E., the poet writes:

> The shrill roaring lotus plays a song with coiling mele, and the golden kithara, the sweet-sounding kithara, accompanies the hymns. And all the artists, dwellers in Attica, hymn your glory, god, famed for playing the kithara, son of great Zeus ....[9]

The discovery of actual pieces of music with such evocative texts excited scholars and musicians all over Europe with the prospect of understanding the legendary powers of Greek music, heightening an enthusiasm for the subject that had been growing throughout the nineteenth century. Friedrich Nietzsche's Basel lecture

---

gang kein Verlust." *Geschichte der europäisch-abendländischen oder unserer heutigen Musik: Darstellung ihres Ursprungs, ihres Wachstumes und ihrer stufenweise Entwickelung; von dem ersten Jahrhundert des Christentumes bis auf unsere Zeit* (Leipzig: Breitkopf und Härtel, 1834); translated by Robert Müller as *History of the Modern Music of Western Europe: From the First Century of the Christian Era to the Present* (London: Newby, 1848), 1.

[8] See especially Karl von Jan, *Musici scriptores graeci. Aristoteles. Euclides. Nicomachus. Bacchius. Gaudentius. Alypius et melodiarum veterum quidquid exstat* (Leipzig: Teubner, 1895; reprint, Hildesheim: Olms, 1962); and J. F. Bellermann, *Die Hymnen des Dionysius und Mesomedes* (Berlin: Förstner, 1840). Those known by 1970 are examined in Pöhlmann, *Denkmäler*. Brief discussions of many of the pieces appear as well in Giovanni Comotti, *Music in Greek and Roman Culture*, trans. Rosaria V. Munson (Baltimore, Md.: Johns Hopkins University Press, 1989), 99–120; and Martin L. West, *Ancient Greek Music* (Oxford: Clarendon, 1992), 283–326 (preceded by an updated list of the pieces). Some of the extant pieces of music will be transcribed and discussed in the following chapters.

[9] ... λιγὺ δὲ λωτοὸς βρέμων αειόλοιοις μ̣[έ]λεσιν ὠιδαὰν κρέκει· χρυσέα δ' ἀδύθρου[ς] [κί]θαρις ὕμνοισιν ἀναμέλπεται̣. Ὁ δὲ [τεχνι]τωῶν πρόπας ἑσμὸς 'Αθθίδα̣ λαχὼ[ν] [τὸν κιθαρί]σει κλυτὸν παῖδα μεγάλου [Διὸς ὑμνοῦσί σε .... Delphi Inv. Nr. 517, 526, 494, 499. See Pöhlmann, *Denkmäler*, 61. A revised date and a composer for this piece have recently been proposed by Annie Bélis, "A proposito degli «Inni delfici»," in *La musica in Grecia*, ed. Bruno Gentili and Roberto Pretagostini, Storia e società (Roma-Bari: Laterza, 1988), 205–18; and idem, *Les deux hymnes delphiques à Apollon: Étude épigraphique et musicale*, Corpus des inscriptions de Delphes, vol. 3 (Paris: de Boccard, 1992), 54–55.

"Das griechische Musikdrama"[10] found a receptive audience in Richard Wagner, who was particularly interested in ancient Greek drama and the pervasive use of music in the theatre of the Greeks. His conception of *Der Ring des Nibelungen* was profoundly influenced by his understanding of Greek *Musikdrama.* Not everyone, however, shared in the enthusiasm. Giuseppe Verdi, with reference to the paean to Apollo, offered the laconic remark: "I saw it, but understood nothing"; and concluded: "Research into the art of Greek music is pointless."[11]

All the discoveries of the previous centuries, not to mention the ever-growing body of secondary literature on the subject, made Vitruvius's remark a classic understatement. When Wilfrid Perrett addressed the Royal Musical Association in England in 1932, he recalled:

> The only professor of Greek I have ever known who was also a musician always refused on principle to give me any help with a stiff passage from a Greek author on music. His reply was always the same: "Put that stuff away. Nobody has ever made head or tail of Greek music, and nobody ever will. That way madness lies."[12]

While the study of ancient Greek music and music theory may at times be maddening indeed (we might say this of any music), it ultimately reveals a relatively complete view of a complex musical culture—a culture that has exerted a profound influence for more than two thousand years. Though we may never be able to reconstruct every detail of the music of the ancient Greeks, by proceeding in a careful and methodical way, as free from preconceptions as possible, we can develop the quite complete picture of ancient Greek music scholars have for centuries been trying to form. The intrinsic interest of the subject is well attested by their efforts. Moreover, the influence of ancient Greek music is widespread in the history of Western, Islamic, and Byzantine culture, from the music theory of the Middle Ages through the modern music of Olivier Messiaen and Iannis Xenakis, in notions of the influence of music on behavior from the Church Fathers through today's music therapists, or even in views of the harmonic ordering of the universe from Ptolemy through Kepler and on to the present. It is thus important to a full understanding of these later cultures.[13]

---

[10] The lecture was originally delivered at the University of Basel on 18 January 1870. Nietzsche read the lecture to Wagner during a visit to his home on 11 June 1870. See Martin Gregor-Dellin and Dietrich Mack, eds., *Cosima Wagner's Diaries,* volume 1, *1869–1877,* trans. Geoffrey Skelton (New York: Harcourt Brace Jovanovich, 1978), 231–32. See also Richard Günther, "Richard Wagner und die Antike," *Neue Jahrbücher* 16 (1913): 323–37.

[11] The remarks are recorded in two separate reminiscences: the first in Italo Pizzi, *Ricordi verdiani inediti* (Turin: Roux e Viarengo, 1901); the second in Arnaldo Bonaventura, *Ricordi e ritratti (fra quelli che ho conosciuto),* Quaderni dell' Accademia Chigiana, vol. 24 (Siena: Ticci, 1950). Both are quoted in Marcello Conati, *Interviews and Encounters with Verdi,* trans. Richard Stokes (London: Gollancz, 1984), 285 and 347.

[12] Wilfrid Perrett, "The Heritage of Greece in Music," *Proceedings of the Musical Association* 58 (1931–32): 85.

Overview and Sources

The Greek concept of music, μουσική, was rather different from the modern Western concept. Music was an art, but it was also a science. It could be used for simple relaxation and entertainment, yet it played as well a central role in the civic and religious life of the people. While Plato employed music as a cosmological paradigm in the *Timaeus,* he was also concerned in the *Respublica* and the *Leges* with the specific issues of the influence of music on behavior and the types of music that should be allowed in an enlightened civilization. Aristotle elaborated on the educational function of music in Book VIII of the *Politica* and pointed out its effect in the development of character. Several centuries later, at the twilight of the ancient world, Aristides Quintilianus[14] provided a comprehensive description in his *De musica*:

> Music is a science, certainly, in which exists sure and infallible knowledge, for whether we speak of it in terms of problems or effects, it would never demonstrate any change or alteration. And indeed, we might also with reason call it an art, for it is both a composite of perceptions . . . and is not useless to life.[15]

---

[13] See Ingemar Düring, "Impact of Greek Music on Western Civilization," in *Proceedings of the Second International Congress of Classical Studies* [1954] (Copenhagen: E. Munksgaard, 1958), 169–84.

[14] Late third or early fourth century C.E. Unless otherwise noted, dates throughout follow Luci Berkowitz and Karl A. Squitier, eds., *Thesaurus Linguae Graecae: Canon of Greek Authors and Works,* 2d ed. (New York: Oxford University Press, 1986).

[15] ἐπιστήμη μὲν οὖν ἐστιν [μουσική], ᾗ γνῶσις ἀσφαλὴς ὑπάρχει καὶ ἀδιάπτωτος· τῶν γὰρ ἐν αὐτῇ λεγομένων ἢ ὡς προβλημάτων ἢ ὡς ἀποτελεσμάτων οὐκ ἄν ποτε μεταβολὴν ἢ ἀλλοίωσιν ἐπιδείξαιτο. καὶ μὴν καὶ τέχνην αὐτὴν εὐλόγως ἂν

This is not mere hyperbole. Music was in fact used in all of the activities of Greek life: in schooling, religious ceremony, mundane work, theatrical performance, the singing of poetry, and recreation. In Book II of his treatise, Aristides Quintilianus remarks on this pervasiveness:

> There is certainly no action among men that is carried out without music. Sacred hymns and offerings are adorned with music, specific feasts and the festal assemblies of cities exult in it, wars and marches are both aroused and composed through music. It makes sailing and rowing and the most difficult of the handicrafts not burdensome by providing an encouragement for the work.[16]

In a culture where music played such a pervasive role, it is necessary for the historian to take a broad view of source material. Four principal types of sources are available for the study of ancient Greek music and music theory: literature, works of graphic or plastic art, archaeological remains, and notated pieces of music. No one of these classes of source material alone is sufficient to present a complete picture. Each gains in clarity from light shed by the others, and it is only when they are viewed as a complex that the richness, beauty, and vitality of the music and music theory begins to be sensed.

Literature

Musical allusions and general descriptions of music appear to a greater or lesser degree in the *Iliad* and the *Odyssey*, in lyric poetry, and in dramatic works of ancient Greece. Moreover, nearly all this literature was sung, danced, and accompanied by musical instruments. The literature itself is therefore a part of the musical heritage of Greece. In addition, general descriptions of music and music theory abound in philosophy, collections of anecdotes, and similar types of literature. Plato, Aristotle, Plutarch, Sextus Empi-

---

ἀποκαλοῖμεν· σύστημά τε γάρ ἐστιν ἐκ καταλήψεων, ... καὶ οὐκ ἄχρηστος τῷ βίῳ ... (R. P. Winnington-Ingram, ed. *Aristidis Quintiliani De musica libri tres* [Leipzig: Teubner, 1963], 4.24–5.3). Translation from Thomas J. Mathiesen, *Aristides Quintilianus on Music in Three Books,* Music Theory Translation Series (New Haven, Conn.: Yale University Press, 1983), 75.

[16] Οὔκουν ἔνεστι πρᾶξις ἐν ἀνθρώποις ἥτις ἄνευ μουσικῆς τελεῖται. θεῖοι μὲν ὕμνοι καὶ τιμαὶ μουσικῇ κοσμοῦνται, ἑορταὶ δὲ ἴδιαι καὶ πανηγύρεις πόλεων ἀγάλλονται, πόλεμοι δὲ καὶ ὁδῶν πορεῖαι διὰ μουσικῆς ἐγείρονταί τε καὶ καθίστανται· ναυτιλίας τε καὶ εἰρεσίας καὶ τὰ χαλεπώτατα τῶν χειρωνακτικῶν ἔργων ἀνεπαχθῆ ποιεῖ τῶν πόνων γινομένη παραμύθιον (W.-I. 57.23–29). Mathiesen, *AQ on Music,* 120.

ricus, and many other representatives of various philosophical schools wrote in considerable detail about the use, character, and value of music. Historical, anecdotal, and lexicographical works such as Pausanias's *Graeciae descriptio*, Athenaeus's *Deipnosophistae*, Plutarch's *Quaestiones convivales*, Photius's *Bibliotheca*, the *Etymologicon magnum*, the *Suda*, or Pollux's *Onomasticon*[17] contain a wealth of valuable detail on matters ranging from the construction and use of musical instruments, to the types of music and the occasions when they might be used, and on to the effect of music on behavior.

Technical or systematic works that treat the theory of ancient Greek music are a particular type of literary source important to this subject. Like the other literary sources, these range over a wide period of time from the fourth century B.C.E. to the fourth or fifth centuries C.E.[18] Some of the treatises are technical manuals that provide valuable detail about the Greeks' musical system, including notation, the function and placement of notes in a scale, characteristics of consonance and dissonance, rhythm, and types of musical composition. This group includes the *Sectio canonis* (sometimes attributed to Euclid); Cleonides, *Harmonica introductio*; Nicomachus of Gerasa, *Manuale harmonices*; Gaudentius, *Harmonica introductio*; Alypius, *Introductio musica*; Bacchius Geron, *Introductio artis musicae* and a companion treatise transmitted under the same title; Theon of Smyrna, *Expositio rerum mathematicarum ad legendum Platonem utilium*; and miscellaneous shorter texts and fragments.[19] By contrast, other treatises are long and elaborate books that grapple with basic scientific problems or show the way in which the science of music reveals universal patterns of order, thereby leading to the highest levels of knowledge and understanding. These longer books were written by such well-known figures of antiquity as Aristoxenus, disciple and presumptive successor of Aristotle as head of the Lyceum, and Claudius Ptolemy, the great Alexandrian astronomer; and by associates of Plotinus and the neo-Platonists such as Porphyrius and Aristides Quintilianus.[20]

---

[17] Pausanias, Athenaeus, Plutarch, and Pollux are writers of the second and third centuries C.E.; Photius, the *Suda*, and the *Etymologicon magnum* are later Byzantine sources. Numerous editions and translations exist for the philosophers and for poetic and dramatic works; these will be discussed in chapter 2. The evidence of anecdotal works will be employed throughout the chapters.

[18] Or even later, when works written in late antiquity and the Middle Ages in Latin, Greek, and Arabic are included. These works, however, are more properly considered representatives of the transmission of ancient Greek music theory than parts of the primary corpus of ancient Greek music theory. See chapter 7 for an overview of the survival of ancient Greek music theory in this later literature.

[19] Greek texts for all but Theon of Smyrna appear in Jan, *Musici scriptores graeci*; Theon's text appears in *Theonis Smyrnaei philosophi Platonici. Expositio rerum mathematicarum ad legendum Platonem utilium*, rec. Eduardus Hiller (Leipzig: B. G. Teubner, 1878; reprint in Greek and Roman Philosophy, vol. 42,

While the more general types of literary works have in most cases been the subject of extensive and intensive critical work, relatively few of the technical and systematic works exist in critical texts or translations that would satisfy modern standards of scholarship. The transmission of ancient Greek music theory is more

---

New York: Garland, 1987). For a full list of translations arranged in chronological order, see the Bibliography.

[20] For a study of Aristoxenus (ca. 375/360–after 320 B.C.E.) and his work, the classic treatment by Louis Laloy (*Aristoxène de Tarente, disciple d'Aristote et la musique de l'antiquité* [Paris: Société française d'imprimerie et de librairie, 1904; reprint, Genève: Minkoff, 1973]) is still of value. There is also an excellent recent study of Aristoxenus and his work within the context of Aristotelian philosophy: Annie Bélis, *Aristoxène de Tarente et Aristote: Le traité d'harmonique,* Études et commentaires, vol. 100 (Paris: Klincksieck, 1986).

On Claudius Ptolemy (fl. 127–148 C.E.), see Ingemar Düring, ed., *Die Harmonielehre des Klaudios Ptolemaios,* Göteborgs Högskolas Årsskrift, vol. 36/1 (Göteborg: Elanders, 1930; reprint, New York: Garland, 1980). A German translation appears in idem, *Ptolemaios und Porphyrios über die Musik,* Göteborgs Högskolas Årsskrift, vol. 40/1 (Göteborg: Elanders, 1934; reprint, New York: Garland, 1980). A lightly annotated English translation appears in Andrew Barker, *Greek Musical Writings,* volume 2, *Harmonic and Acoustic Theory,* Cambridge Readings in the Literature of Music (Cambridge: Cambridge University Press, 1989), 275–391. A new and much more fully annotated translation by Jon Solomon awaits publication.

On Porphyrius (232/3–ca. 305 C.E.), see Ingemar Düring, ed., *Porphyrios Kommentar zur Harmonielehre des Ptolemaios,* Göteborgs Högskolas Årsskrift, vol. 38/2 (Göteborg: Elanders, 1932; reprint, New York: Garland, 1980) for a Greek text; and idem, *Ptolemaios und Porphyrios,* for partial translation. Some of the fragments quoted by Porphyrius are translated into English in Barker, *Greek Musical Writings,* 2:229–44.

On Aristides Quintilianus, see Mathiesen, *AQ on Music,* for an English translation with annotations and commentary (and for numerous emendations to Winnington-Ingram's Greek text). A more lightly annotated English translation that represents a less careful view of the text and the field appears in Barker, *Greek Musical Writings,* 2:399–535.

complicated than the transmission of other parts of Greek literature for a variety of reasons, not the least of which are the technical subject matter, the presence of many numbers, formulaic patterns of expression, and the appearance of complicated diagrams and notation. All of these features are difficult for a scribe to copy and are subject to wide variation. If there were only five or ten manuscript codices for each treatise, the process of collation would be straightforward, on the whole. But this is not the case. Eighty-four codices preserve complete copies of the treatise of Ptolemy, Porphyrius's commentary on Ptolemy's treatise exists in more than seventy codices, complete copies of Aristides Quintilianus's treatise appear in fifty-six codices, Aristoxenus's books are copied into fifty manuscripts, and even the shorter and more modest treatises exist in more than twenty codices. Sometimes the manuscripts are relatively easy to read, and the transcription of the text is not problematic. But in many cases, problems do arise, and passages may be subject to varying transcription and interpretation.

A considerable amount of effort has been devoted in recent years to improving the condition of the theoretical texts and to reading them more carefully.[21] The Répertoire International des Sources Musicales (RISM) now includes a *catalogue raisonné* of all the Greek manuscript codices that contain the body of music theory, which facilitates the production of new editions and translations of this literature by identifying the primary sources.[22] The series *Greek and Latin Music Theory* (GLMT), begun in 1984, provides a medium for the publication of these texts, together with facing-page translations, introduction, and commentary.[23] Likewise, the *Music Theory Translation Series* includes several relevant translations.[24] In addition, new critical texts and translations are beginning to appear with some frequency in theses and dissertations.[25] Finally, the *Thesaurus Linguae Graecae,* a computer-based data bank of ancient Greek texts centered at the University of California at Irvine, makes it possible to search, retrieve, and compare terms and passages across the very wide range of texts already contained in the database. With this tool, the technical terminology and the use and development of musical concepts can be studied in a more complete and broadly based context than had heretofore been feasible.

---

[21] For a summary of issues and problems, see André Barbera, "Introduction," in *Music Theory and Its Sources: Antiquity and the Middle Ages*, ed. André Barbera (Notre Dame, Indiana: University of Notre Dame Press, 1990), 1–18.

[22] Thomas J. Mathiesen, *Ancient Greek Music Theory: A Catalogue Raisonné of Manuscripts*, RISM, BXI (Munich: G. Henle, 1988).

[23] Published by the University of Nebraska Press under the general editorship of Thomas J. Mathiesen. Ten volumes have been published to date, two of which are devoted to Greek music theory: Sextus Empiricus, *ΠΡΟΣ ΜΟΥΣΙΚΟΥΣ: Against the Musicians (Adversus musicos)*, ed. and trans. Denise Davidson Greaves, GLMT, vol. 3 (Lincoln: University of Nebraska Press, 1986); André Barbera, ed. and trans., *The Euclidean Division of the Canon: Greek and Latin Sources*, GLMT, vol. 8 (Lincoln: University of Nebraska Press, 1991).

Graphic and Plastic Art

Literary sources can supply much useful information about music—and certainly about the history of music—but by their nature, they are not especially useful in determining how music was performed or what it sounded like. Answers to these questions must be discovered from the music itself, musical instruments, and sources that show the Greeks singing, dancing, and playing their musical instruments. In the latter case, it is most fortunate that the Greeks decorated their pottery with hundreds of scenes of music-making. These iconographic sources illustrate the appearance of the instruments, the manner in which they were played (to some degree), and the social contexts in which music was used, ranging from music lessons to processions, banquets, the theatre, and the festivals. Various types of lyres, the aulos (αὐλός), and percussion instruments are seen being tuned, being played alone or ensemble, or sometimes simply hanging on a wall. In addition to painting, various types of statuary, gemstones, and coins exhibit instruments in three dimensions or low relief, and these are useful in interpreting the perspective shown in painting.[26]

---

[24] Published by Yale University Press under the general editorship of Claude V. Palisca. See also n. 15 *supra.*

[25] These will be cited as appropriate in the following chapters.

[26] Iconographic sources have not yet been fully tapped for the evidence they can supply. Venerable sources include Curt Sachs, *Real-Lexikon der Musikinstrumente,* 2d enl. ed. (New York: Dover, 1964); idem, *The History of Musical Instruments* (New York: Norton, 1940); and Emanuel Winternitz, *Musical Instruments and Their Symbolism in Western Art* (London: Faber & Faber, 1967). The most important work has been done by Martha Maas and Jane M. Snyder, *Stringed*

Archaeological Remains

Although not iconographic sources, remains of musical instruments discovered in archaeological excavations have found their way into the collections of a number of museums of art and archaeology. These fragments, if properly interpreted, are of incalculable value in making reconstructions of instruments that can help bridge the gap between the mute, frozen performances captured by the graphic or plastic artists and that most elusive of the parts of music, the sound itself.[27]

Notated Musical Compositions

A final source of inestimable importance is the body of musical fragments. These appear in manuscripts, on stone, and on papyrus. In 1972, the late Gustave Reese wrote:

> How maddening it is that, of all the music that was once sung and played in connection with the plays of Aeschylus, Sophocles, Euripides, and Aristophanes, only a tiny fragment of music for the Orestes of Euripides has been found. Of course, we must be resigned to the fact that this gap may never be narrowed, no matter how hard scholars may exert themselves. But scraps of ancient Greek music do continue to be found from time to time, and we may hope that the end has not yet been reached.[28]

Reese's hope was not misplaced. In the last twenty-five years, several new pieces, including another fragment from a work of Euripides, *Iphigenia in Aulis*, have come to light, and at least forty-five fragments ranging across seven centuries from the third century B.C.E. to the fourth century C.E. are now known.[29] Some of these pieces are indeed quite fragmentary, but some of them are not fragments at all: they are complete or nearly complete compositions. Aided by the other sources, we can transcribe these pieces

---

Instruments of Ancient Greece (New Haven, Conn.: Yale University Press, 1989); see also additional works by these authors listed in the Bibliography. Works by other authors will be cited as the instruments are discussed in chapter 3.

[27] These will be discussed in chapter 3.

[28] Gustave Reese, "Perspectives and Lacunae in Musicological Research: Inaugural Lecture," in *Perspectives in Musicology*, ed. Barry S. Brook, Edward O. D. Downes, and Sherman van Solkema (New York: Norton, 1972), 6–7. The inaugural lecture was presented for the establishment of the Ph.D. Program in Music at the City University of New York.

[29] The number remains approximate due to differences of opinion about the proper characterization of a "piece."

with reasonable certainty, from which we can in turn draw out sounds to complement the silent testimony of literature and art.[30]

Methodology

With the abundance of source material available for the study of ancient Greek music, it is natural enough that various approaches are possible. In this century, the subject has attracted the attention of scholars chiefly in classical philology and musicology, and to a lesser extent in comparative literature, ancient philosophy, art history, and papyrology. Apart from general articles in encyclopedias or multi-volume histories,[31] scholarship for the first three quarters of the century emphasized the creation of critical texts, translations, studies of sources, and detailed analyses of specific topics. Curt Sachs, Théodore Reinach, Walther Vetter, and Max Wegner were exceptional in attempting short histories of ancient music: Sachs in *Die Musik der Antike,* which appeared in 1928 as a part of Ernst Bücken's *Handbuch der Musikwissenschaft,* and in his later and more comprehensive book, *The Rise of Music in the Ancient World;* Reinach in *La musique grecque;* Vetter in *Antike Musik;* and Wegner in *Das Musikleben*

---

[30] The more complete compositions will be transcribed and analyzed in chapter 2.

[31] The most important of these are Maurice Emmanuel, "Grèce," in *Encyclopédie de la musique et dictionnaire du Conservatoire,* 11 vols. (Paris: Delagrave, 1913–31), I/1:377–537; Walther Vetter, "Griechenland, antike," *Die Musik in Geschichte und Gegenwart* (hereafter *MGG*), 17 vols., ed. Friedrich Blume (Kassel: Bärenreiter, 1949–67), 5:839–65; Isobel Henderson, "Ancient Greek Music," in *Ancient and Oriental Music,* ed. Egon Wellesz, New Oxford History of Music, vol. 1 (London: Oxford University Press, 1957), 336–403; J. F. Mountford and R. P. Winnington-Ingram, "Music," in *The Oxford Classical Dictionary,* 2d ed., ed. N. G. L. Hammond and H. H. Scullard (Oxford: Clarendon, 1970), 705–13; Reginald P. Winnington-Ingram, "Greece, §I (Ancient)," in *The New Grove Dictionary of Music and Musicians* (hereafter *NGD*), 20 vols., ed. Stanley Sadie (London: Macmillan, 1980), 7:659–72; Andrew Barker, "Music," in *The Oxford Classical Dictionary,* 3d ed. (hereafter *OCD*), ed. Simon Hornblower and Anthony Spawforth (Oxford: Oxford University Press, 1996), 1003–12; and Thomas J. Mathiesen, "Greece, §I (Ancient)," in *The New Grove Dictionary of Music and Musicians,* 2d ed., ed. Stanley Sadie (London: Macmillan, forthcoming). Although not a dictionary or encyclopedia article, a useful general treatment also appears in Ingemar Düring, "Greek Music: Its Fundamental Features and Its Significance," *Journal of World History* 3 (1956): 302–29.

der Griechen.[32] These, however, remained solitary attempts until the last few years.

In 1977, Annemarie Jeanette Neubecker's and Günther Wille's introductions to ancient Greek and Roman music, both published in the series *Die Altertumswissenschaft,* provided short but useful surveys of these musical cultures.[33] The next year, Solon Michaelides published an encyclopedia devoted entirely to the subject of ancient Greek music, and this was quickly followed by Giovanni Comotti's short monograph for the series *Storia della musica.* Comotti later expanded his book in an English translation.[34] Meanwhile, the *Neues Handbuch der Musikwissenschaft* had begun publication of a series of volumes intended to update the old Bücken *Handbuch,* and in 1989, *Die Musik des Altertums* was issued, edited by Albrecht Riethmüller and Frieder Zaminer.[35] In the 1990s, two monographs on ancient Greek music appeared in rapid succession: first, Martin West's *Ancient Greek Music* (1992), and then, shortly thereafter, Warren Anderson's *Music and Musicians in Ancient Greece* (1994).[36] These volumes, as would be expected, exhibit their authors' distinctive perspectives and interests, which tend to complement rather than duplicate each another. This substantial body of scholarship published over the past twenty years makes apparent an emerging interest in full-scale histories of ancient Greek music.

---

[32] Curt Sachs, *Die Musik der Antike,* Handbuch der Musikwissenschaft, vol. 8/3 (Wildpark-Potsdam: Athenaion, 1928); idem, *The Rise of Music in the Ancient World: East and West* (New York: Norton, 1943); Théodore Reinach, *La musique grecque* (Paris: Payot, 1926; reprint, Paris: Edition Aujourd'hui, 1976); Walther Vetter, *Antike Musik* (München: E. Heimeran, 1935). These works were anticipated by a few years by 'Αδαμάντιος Ρεμαντᾶς and Προκόπιος Δ. Ζαχαρίας, *'Αρίων: Ἡ μουσικὴ τῶν Ἑλλήνων ὡς διεσώθη ἀπὸ τῶν ἀρχαιοτάτων χρόνων μέχρι τῆς σήμερον* ('Αθῆναι: Ζαγκουρόγλου, 1917), but the book was hardly known outside Greece. Max Wegner, *Das Musikleben der Griechen* (Berlin: W. de Gruyter, 1949) is a more substantial book, but with a primarily literary and sociological concentration.

In this summary of scholarship, only twentieth-century works are included. There are also C. F. Weitzmann's thirty-six-page *Geschichte der griechischen Musik* (Berlin: Hermann Peters, 1855; reprint, Wiesbaden: Sändig, 1973) and the important and extended treatments in, for example, François Auguste Gevaert, *Histoire et théorie de la musique de l'antiquité,* 2 vols. (Gand: Annoot-Braeckman, 1875–81; reprint, Hildesheim: Olms, 1965); and August Rossbach and Rudolf Westphal, *Theorie der musischen Künste der Hellenen,* 4 vols. (Leipzig: B. G. Teubner, 1885–89; reprint, Hildesheim: Olms, 1966). In addition, detailed treatments appear in several of the comprehensive histories of the eighteenth and nineteenth centuries, especially those of Sir John Hawkins and A. W. Ambros. Complete references to these and other general treatments will be found in the Bibliography.

[33] Annemarie Jeanette Neubecker, *Altgriechische Musik: Eine Einführung,* Die Altertumswissenschaft (Darmstadt: Wissenschaftliche Buchgesellschaft, 1977); Günther Wille, *Einführung in das römische Musikleben,* Die Altertumswissenschaft (Darmstadt: Wissenschaftliche Buchgesellschaft, 1977).

[34] Solon Michaelides, *The Music of Ancient Greece: An Encyclopaedia* (London: Faber and Faber, 1978); Giovanni Comotti, *La musica nella cultura greca e romana,* Storia della musica, vol. 1/1 (Torino: Edizioni di Torino, 1979); expanded in *Music in Greek and Roman Culture* (see n. 8 *supra*).

Whether dealing with a particular topic or surveying the subject as a whole, scholars have brought their particular methods to bear on their treatments, as is to be expected. But on occasion, the scholars of one discipline have been quick to dismiss the work of scholars in another discipline on methodological grounds. This is unfortunate because by its nature, the subject of ancient Greek music and music theory spans a number of disciplines, all essential to a full understanding of the subject.

It is clearly impossible to write a single monograph on ancient Greek music and music theory that could satisfy all the diverse interests of the various disciplines, each of which emphasizes different types of evidence and interprets it in different ways. I must therefore state at the outset that this book is aimed principally at the musicologically oriented reader. It will be very much concerned with the systematic theory of music and the influence of this theory on early medieval cultures, East and West, no less than with the sociology, philosophy, psychology, and aesthetics of music. It will of course be concerned as well with the analysis and interpretation of the surviving pieces of music, especially as they relate to the particular musico-poetic forms.

Most of the source material for a book of this sort will be unfamiliar to my readers, and indeed, much of the material can hardly be considered familiar even to a handful of specialists. The following chapters will accordingly include a larger number of extended quotations from theoretical and literary sources than might ordinarily be expected; this will enable readers to assess for themselves my interpretations of the sources, as well as providing substantial examples of the Greeks themselves speaking about their own music. Moreover, issues of terminology play a substantial role in the interpretation of any literary document, and as literary documents are of considerable importance in the study of ancient Greek music, it is necessary to deal with these issues. Not every reader, of course, will be able to address material presented only in Greek and Latin, and insofar as possible, I will therefore give all material in the body of the text in English. Some of this material has appeared in other English translations elsewhere, but some of it has never been published in English. In all cases, the original texts are given in full in the footnotes, and readers may thus easily refer to the original sources or not, according to their own preferences.

---

[35] Albrecht Riethmüller and Frieder Zaminer, eds., *Die Musik des Altertums*, Neues Handbuch der Musikwissenschaft, vol. 1 (Laaber: Laaber-Verlag, 1989). André Barbera provides an extended review of the books by Riethmüller-Zaminer and Comotti in the *Journal of the American Musicological Society* 43 (1990): 535–67.

[36] West, *Ancient Greek Music* (see n. 8 *supra*); and Warren D. Anderson, *Music and Musicians in Ancient Greece* (Ithaca, NY: Cornell University Press, 1994).

Musicologists, accustomed to the wide diversity of evidence that must be controlled in dealing with nearly any musical subject, tend to take sources at face value as representing an important part—however small—of the subject under study.[37] In the subject of ancient Greek music, each type of source represents a different type of evidence, but the sources are complementary to a remarkable degree. They do, however, range over more than seven centuries, do not agree on every point, and can be interpreted in various ways. For example, a theoretical detail described in a treatise of the second or third century C.E. might appear only in a musical fragment four or five centuries older; one treatise might contradict or confirm a point made in another treatise of an earlier or later date, or it might be a unique witness; a picture might suggest some feature of performance practice nowhere confirmed by any literary evidence; a piece of music might combine notational systems that would appear to be discrete in the theoretical tradition. We must be careful about assuming that a statement written in the second century C.E. applies—or does not apply—to a musical practice of the fourth century B.C.E.

---

[37] By contrast, non-musical scholars may be more interested in the style or perceived "quality" of a source than in its content or potential value. Andrew Barker, for example, after explaining his reasons for the omission of the manuals of Cleonides, Bacchius, Gaudentius, and Bellermann's Anonymous from his *Greek Musical Writings* (2:3), concludes: "I might add that they make dreary reading ...." See the review of this volume by Jon Solomon in *Classical World* 85 (1991–92): 262.

Similar sorts of problems occur, of course, in studying the music of other periods, especially the Middle Ages, but there is perhaps no other period in which sources expanding over such a wide territory and long period of time seem to point inward to a single relatively consistent musical culture rather than outward in all manner of unrelated directions. My method in this book will be to look as closely as possible at as many sources as possible—whether literary, iconographic, or musical—, glean from them whatever evidence may be found, recognize their context, and then try to form the evidence into the fullest and most complete picture. Detail will be added to the picture by figures, musical examples, analyses of compositions, reconstructions of musical instruments, quotations and translations from literary and theoretical sources, and extended bibliographic annotations included in the footnotes.

There is, finally, the question of the region and chronological limits appropriate to this book. Just what is "ancient Greek music and music theory"? Cycladic sculpture of musicians, belonging to a period between 2700 and 2100 B.C.E., has been discovered on the islands of Keros, Thera, and Naxos; frescoes from the Minoan period (ca. 2300–1100 B.C.E.) survive; and various musical artifacts exist from Mycenaean (ca. 1550–1100 B.C.E.) and Iron Age and Early Geometric (1100–800 B.C.E.) cultures. While this iconographic evidence will be considered to some extent in the discussion of musical instruments, the *terminus a quo* envisioned by the phrase "ancient Greek" is intended to be the so-called Archaic Period, which is generally taken as referring to the Greek culture of the eighth through sixth centuries B.C.E. The *terminus ante quem* is more difficult to define because of the vitality of Greek culture long after Greece had ceased to be a military or political power. The far-reaching influence of ancient Greek music and music theory in the Latin, Arabic, and Byzantine traditions insured the survival of important source material in works written throughout at least the first millennium C.E. Nevertheless, the fall of Rome and the collapse of the Western empire in the fifth century C.E. seems a useful point for marking a separation between the last stages of the "ancient" tradition and the first stages of its transmission to the Middle Ages (and beyond) as a legacy.

Within this long period of time, a number of different regions contributed to a culture now commonly considered "Greek." This is not the place to provide a capsule history of ancient Greece and early Byzantium,[38] but on the other hand, a sense of the names, places, and regions that fill this book is needed in order to follow the material of the next chapters. Although modern national boundaries bear some relationship to their ancient counterparts, the location of a great many of the early regions and places may be unfamiliar to some readers. In general, ancient Greek musical culture is centered in the area of modern Greece (including the Peloponnesus); Crete; to the north, the southern regions of Albania, the former Yugoslavia, and Bulgaria; to the west, the southern regions of the Italian peninsula; to the east, Asia Minor; and to the south, the northern regions of the African coast (especially in the area of Libya and Egypt). This area includes peoples and regions frequently noted in early literary sources: peoples such as the Dorians, Ionians, Aeolians, Achaeans, Lydians, Phrygians, Thracians, Macedonians, Libyans, and Egyptians; and regions such as Boeotia, Euboea, Aetolia, Attica, Achaea, Argolis, Laconia, Thessalia, Calabria, and Lucania. The three maps found at the end of this chapter are intended to provide ready reference throughout the book: map 1 illustrates the regions of Greece and the western coast of Asia Minor; map 2 shows Italy; and map 3 provides a detail of Athens.[39]

Now that a general articulation of scope and subject has been outlined, it may be helpful to mark out the path that lies ahead. The second and third chapters concentrate on the role of music in Greek society, musical typology, organology, and performance practice. The breadth and richness of ancient Greek musical culture appears most clearly in the variety of musico-poetic types; the diversity of instruments of all shapes, sizes, and kinds; and the traditions observed in performing specific compositional types, for example, hymns or the tragedy or a processional. The next chapters are devoted to the music theory itself, as it developed in three stages: first, in the treatises of Aristoxenus and the *sectio canonis* (chapter 4); then during the period of revival in the second century C.E. (chapter 5); and finally, in late antiquity (chapter 6). In these chapters, each theorist and treatise is considered separately, but always within the context of the emerging traditions. The theory provides a remarkably complete and coherent system for explaining and analyzing musical phenomena, and it is not surprising that a great deal of its conceptual framework, as well as much of its terminology, was borrowed and adapted by medieval Latin, Byzantine, and Arabic music theorists. This legacy is reviewed in the seventh chapter, which concludes with a brief epilogue. Transcriptions and analyses of some of the more complete pieces of Greek music preserved on papyrus or stone, or in manuscript, will be included within chapter 2. An integration of the musical remains with a consideration of the musico-poetic types seems preferable to presenting them in a section of their own, as has been the tradition in earlier monographs. Completing the book is a comprehensive bibliography for the field, which is intended to update and expand my earlier *Bibliography of Sources for the Study of Ancient Greek Music.*[40]

---

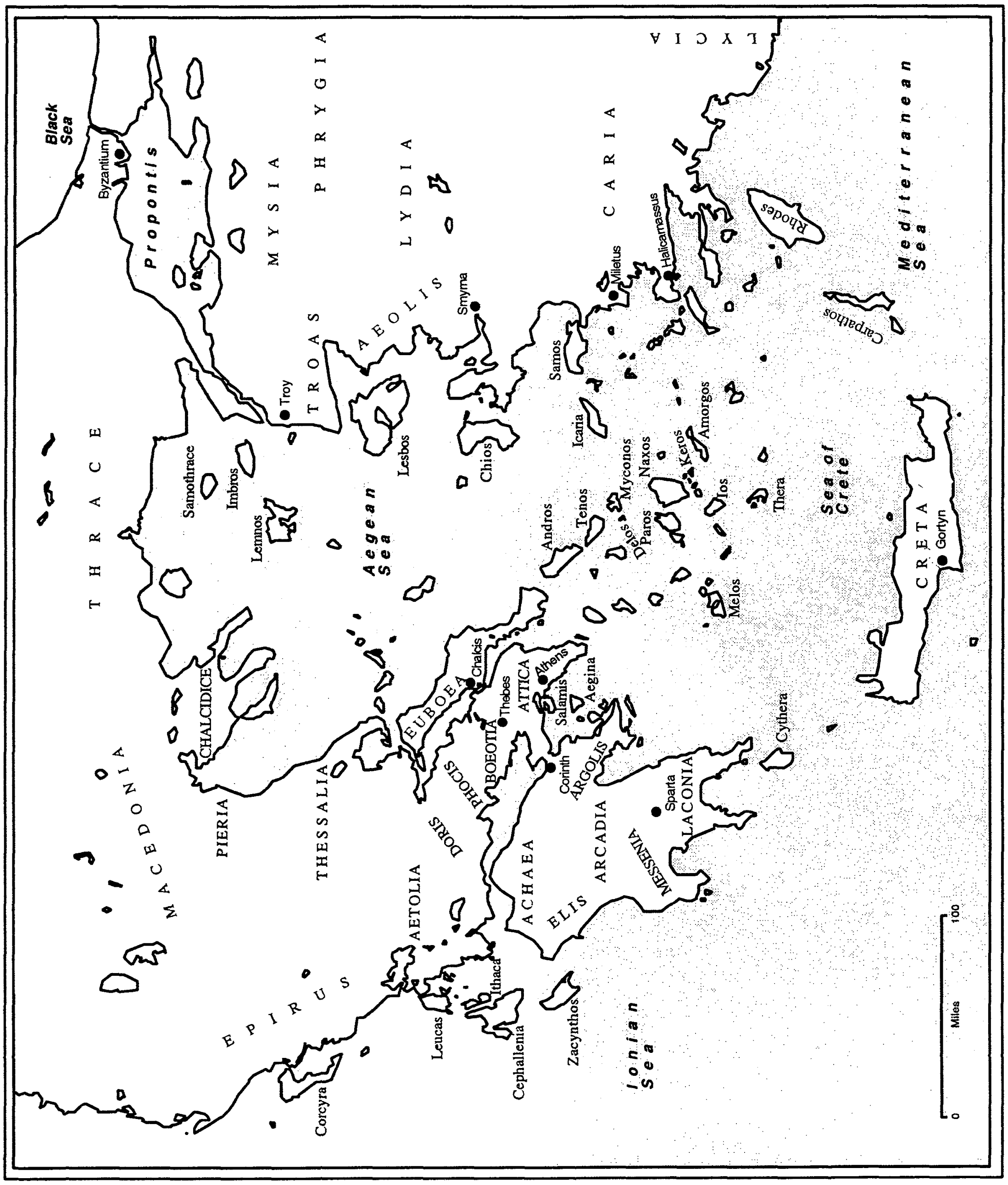
[38] For a brief history, see Paul Halstead, Oliver T. P. K. Dickinson, Simon Hornblower, and Anthony J. S. Spawforth, "Greece," in *OCD*, 648–53; and other articles on individual peoples and regions.

[39] Maps 1–2 were created for this book; map 3 is from the 1938 reprint of the *Atlas of Ancient and Classical Geography,* Everyman's Library (London: J. M. Dent & Sons; New York: E. P. Dutton, 1907), 38.

No single book can fully explore every topic, and this one will not pretend to do so. Nevertheless, I do hope that the treatments here, taken together with the bibliography and the documentary material, will provide a basis for readers to use in pursuing their own particular interests within the endlessly fascinating field of ancient Greek music.

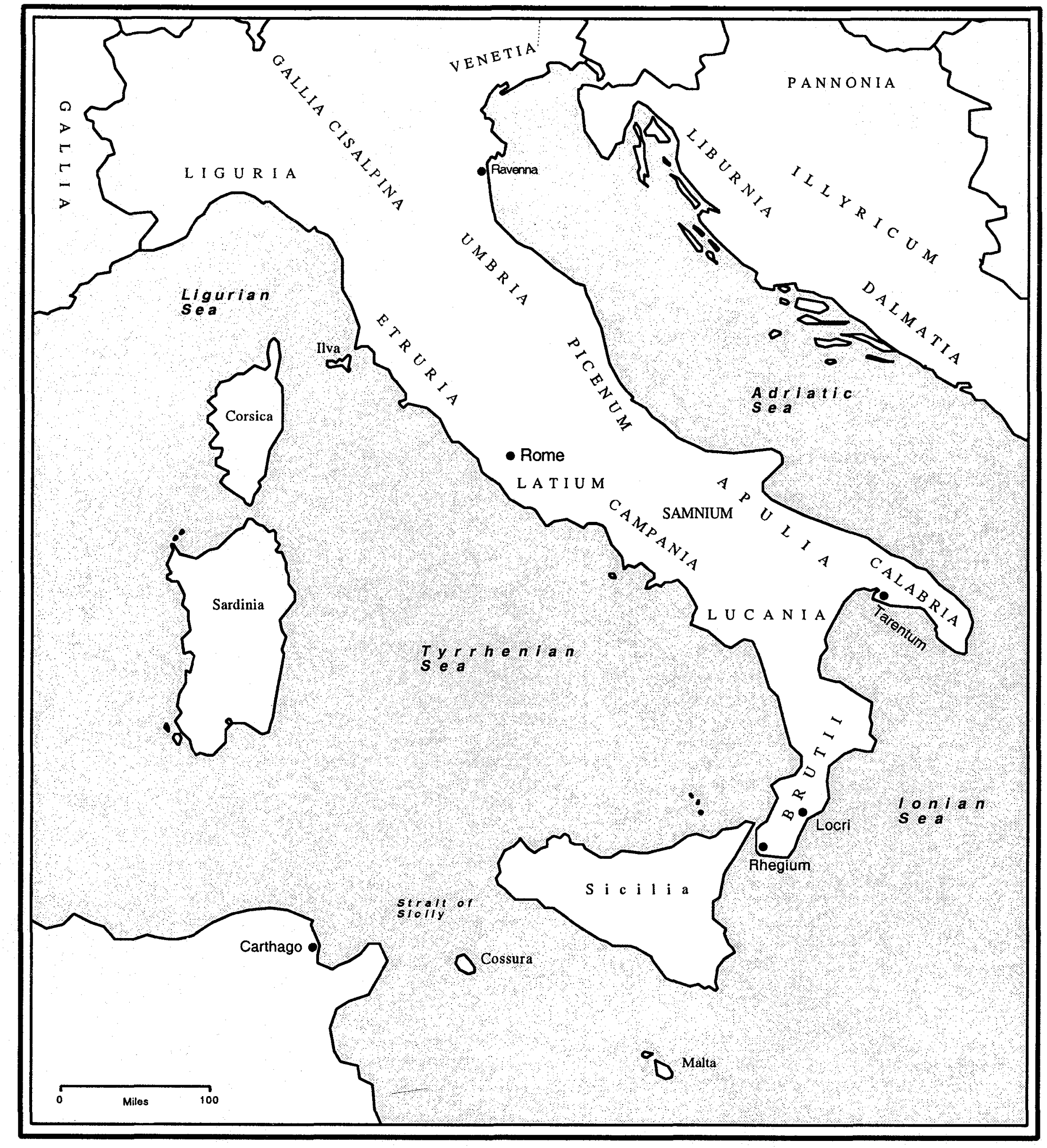
---

[40] Music Indexes and Bibliographies, no. 10 (Hackensack, N.J.: Boonin, 1974).


Black Sea
Byzantium
THRACE
Propontis
MACEDONIA
Samothrace
Imbros
Lemnos
CHALCIDICE
PIERIA
MYSIA
Troy
TROAS
PHRYGIA
EPIRUS
THESSALIA
Aegean Sea
AEOLIS
Lesbos
LYDIA
Corcyra
AETOLIA
EUBOEA
Leucas
DORIS
PHOCIS
Chalcis
Smyrna
Chios
BOEOTIA
Ithaca
Thebes
Cephallenia
ATTICA
ACHAEA
Athens
Andros
Samos
Salamis
Corinth
Zacynthos
ELIS
Tenos
Icaria
ARGOLIS
Aegina
ARCADIA
Miletus
CARIA
Delos
Myconos
Ionian Sea
Paros
Naxos
MESSENIA
Halicarnassus
Sparta
Keros
LACONIA
Amorgos
Melos
Ios
LYCIA
Thera
Rhodes
Cythera
Sea of Crete
Carpathos
Mediterranean Sea
CRETA
Gortyn
0
Miles
100

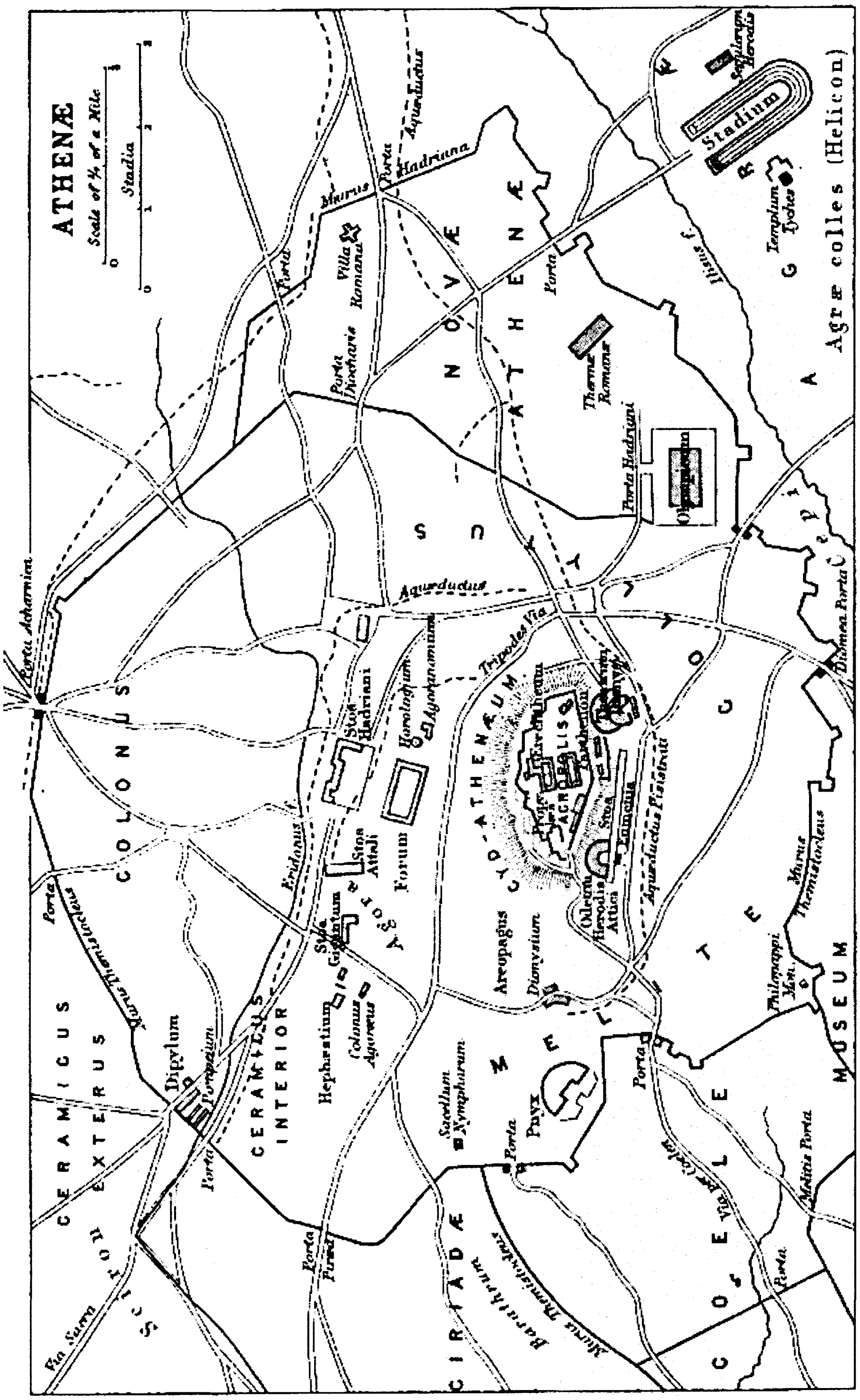
GREECE

Map 1.


GALLIA
LIGURIA
GALLIA CISALPINA
VENETIA
PANNONIA
Ravenna
LIBURNIA
ILLYRICUM
UMBRIA
DALMATIA
Ligurian Sea
ETRURIA
Ilva
PICENUM
Corsica
Adriatic Sea
Rome
LATIUM
APULIA
SAMNIUM
CAMPANIA
Sardinia
CALABRIA
LUCANIA
Tarentum
Tyrrhenian Sea
BRUTII
Ionian Sea
Locri
Rhegium
Sicilia
Strait of Sicily
Carthago
Cossura
Malta
0 Miles 100

ITALY

Map 2.


ATHENÆ
Scale of ½ of a Mile
Stadia
NOVÆ ATHENÆ
Stadium
Sepulcrum Herodis
Templum Tyches
Agræ colles (Helicon)
Ilissus f.
Thermæ Romanæ
Porta Hadriani
Olympieum
Murus Hadriana
Porta
Villa Romana
Porta Diochares
Aquæductus
Porta Acharnica
COLONUS
Stoa Hadriani
Horologium
Agoranomium
Tripodes Via
ACROPOLIS
Parthenon
Erechtheum
Theatrum Dionysi
Stoa Eumenis
Odeum Herodis Attici
Aquæductus Pisistrati
Stoa Attali
Forum
Agora
Eridanus f.
Stoa Gigantum
Hephæstium
Colonus Agoræus
Areopagus
Dionysium
CERAMICUS EXTERUS
CERAMICUS INTERIOR
Dipylum
Pompeium
Murus Themistoclea
Porta
Porta Piræa
Sacellum Nympharum
Pnyx
MELITE
COELE
KOLLYTOS
MUSEUM
Philopappi Mon.
Murus Themistocleus
Melitis Porta
Diomea Porta
CIRIADÆ
Barathrum
Via Sacra
Via Coele

ATHENS

Map 3.

II

Musical Life in Ancient Greece

Music and Melos

Ancient Greek culture boasted a wealth of specific musical forms for a wide range of occasions, and the literary sources preserve examples of hymns, dithyrambs, wedding songs, threnodies, drinking songs, love songs, work songs, and many other types. There is no musical notation for these compositions, with the exception of a few fragments, but the texts themselves provide significant evidence about form, structure, and rhythm, as well as important descriptions of music-making.

In the context of ancient Greek music, as in other traditional musical cultures, the term "composition" must not be misunderstood as implying only a piece of music represented in musical notation. Such compositions of ancient Greek music do exist, but compositions were also transmitted aurally and performed over the years by many different persons, perhaps with individual variations. In other cases, compositions apparently remained individual creations, no longer performed but nevertheless recalled by later Greek writers in descriptive terms that conveyed important and influential features of the work and may indeed have recalled the piece itself to the memory of those who had heard it.

In the earliest traditions, music was performed by a solo singer or by a chorus with and without instrumental accompaniment. Scenes of music-making already appear in the "Shield of Achilles" and elsewhere in the *Iliad*, and the *Odyssey* incorporates both Phemius and Demodocus, two of the most renowned traditional epic singers (ἀοιδός or ᾠδός), as strategic characters within the epic.[1] It is unclear whether the *Iliad* and the *Odyssey* were themselves sung or recited,[2] but extended musical forms—both solo and choral—certainly existed. Pure instrumental music was also popular. Beginning in the sixth century B.C.E., virtuosity and innovation became more prominent in instrumental music, and this in turn encouraged complexity in the other musical forms. A number of poets and philosophers deplored the violation of earlier traditions, but the new styles flourished. Rather remarkable descriptions of some famous compositions survive, including the Pythic Nomos, a composition for the aulos recalled by Strabo[3] in the *Geographica* 9.3.10:

> To those who sang with the kithara, they added auletes and kitharists, who performed without song a certain melos that was called the Pythic Nomos. There are five parts to it, *angkrousis, ampeira, katakeleusmos, iamboi* and *daktyloi, syringes*. Timosthenes, admiral of Ptolemy II, composed it, as well as a treatise in ten books on the arrangement of harbors. He wished to hymn, through this melos, the contest of Apollo against the serpent, representing the prelude with the *angkrousis*; the first onslaught of the contest with the *ampeira*; the contest itself with the *katakeleusmos*; the triumphal song over the victory with the *iamboi* and *daktyloi* by means of such rhythms, the latter of which is suitable for hymns, the *iambos* for

---

[1] The "Shield of Achilles" (*Ilias* 18.478–607) refers to the wedding song (hymenaios), the solo singer with dancing chorus, other dances, and musical instruments such as the aulos and phorminx; see also *Il.* 1.472–74, 9.186–91, 10.13, 13.731, 22.391–94, 24.720–22, etc. On Phemius, see *Odyssea* 1.154 *passim*; Demodocus, *Od.* 8.43–44 *passim*; see also *Od.* 4.17, 8.479–80. The Greeks' musical instruments will be discussed in chapter 3.

[2] A distinction is generally drawn between the epic singer, who accompanied himself on the phorminx and was attached to a particular court, and the rhapsode (ῥαψῳδός), who recited epic poems and travelled from place to place. See Georg Danek, "'Singing Homer': Überlegungen zu Sprechintonation und Epengesang." *Wiener humanistische Blätter* 31 (1989): 1–15.

On the authority of Chamaileon, Athenaeus *Deipnosophistae* 14.12 (620c) asserts that the poetry of Homer, Hesiod, Archilochus, Mimnermus, and Phocylides was sung; and elsewhere (14.32 [632d]) Athenaeus observes that the metric anomalies in Homer were due to fact that all his poetry was set to music (see *Athenaei Naucratitae Dipnosophistarum libri XV*, 3 vols., ed. George Kaibel [Leipzig: B. G. Teubner, 1887–90; reprint, Stuttgart: B. G. Teubner, 1965–66]; there is also a parallel text and English translation in *The Deipnosophists*, trans. C. B. Gulick, 7 vols., Loeb Classical Library [Cambridge: Harvard University Press, 1927–41]). The *Deipnosophistae*, however, dates from the second–third centuries C.E. and may not be a realiable witness on this matter.

[3] First century B.C.E.–first century C.E.

> insults; and the death of the monster with the *syringes* [i.e. , the reeds of the aulos], when the players imitate it expiring with its final whistlings.[4]

This particular composition is not preserved, but similar types of extended and vivid imitative pieces exist in other folk traditions.[5] These provide some idea of the remarkable effects that could have been used in the Pythic Nomos.

Music in this sense of a performing art was called melos (μέλος) by the Greeks. A distinction was made between melos in general, which might be no more than an instrumental piece or a simple song, and perfect melos (τέλειον μέλος), which comprised not only the melody and the text but also highly stylized dance movement. Aristides Quintilianus states:

> And we might fairly speak of perfect melos, for it is necessary that melody, rhythm, and diction be considered so that the perfection of the song may be produced: in the case of melody, simply a certain sound; in case of rhythm, the motion of sound; and in the case of diction, the meter. The things contingent to perfect melos are motion–both of sound and body–and also chronoi and the rhythms based on these.[6]

---

[4] προσέθεσαν δὲ τοῖς κιθαρῳδοῖς αὐλητάς τε καὶ κιθαριστὰς χωρὶς ᾠδῆς, ἀποδώσοντάς τι μέλος ὃ καλεῖται νόμος Πυθικός. πέντε δ' αὐτοῦ μέρη ἐστίν, ἄγκρουσις ἄμπειρα κατακελευσμὸς ἴαμβοι καὶ δάκτυλοι σύρριγγες. ἐμελοποίησε μὲν οὖν Τιμοσθένης, ὁ ναύαρχος τοῦ δευτέρου Πτολεμαίου ὁ καὶ τοὺς λιμένας συντάξας ἐν δέκα βίβλοις. βούλεται δὲ τὸν ἀγῶνα τοῦ 'Απόλλωνος τὸν πρὸς τὸν δράκοντα διὰ τοῦ μέλους ὑμνεῖν, ἄγκρουσιν μὲν τὸ προοίμιον δηλῶν, ἄμπειραν δὲ τὴν πρώτην κατάπειραν τοῦ ἀγῶνος, κατακελευσμὸν δὲ αὐτὸν τὸν ἀγῶνα, ἴαμβον δὲ καὶ δάκτυλον τὸν ἐπιπαιανισμὸν τὸν [γινόμενον] ἐπὶ τῇ νίκῃ μετὰ τοιούτων ῥυθμῶν, ὧν ὁ μὲν ὕμνοις ἐστὶν οἰκεῖος ὁ δ' ἴαμβος κακισμοῖς, σύριγγας δὲ τὴν ἔκλειψιν τοῦ θηρίου, μιμουμένων ὡς ἂν καταστρέφοντος ἐσχάτους τινὰς συριγμούς (*Geographica*, 3 vols., ed. A. Meineke [Leipzig: B. G. Teubner, 1877; reprint, Graz: Akademische Druck- und Verlagsanstalt, 1969], 9.3.10). Cf. with Pollux *Onomasticon* 4.78 (where the piece is attributed to Sacadas) and 84. Abbreviated English translation in Andrew Barker, *Greek Musical Writings*, volume 1, *The Musician and His Art*, Cambridge Readings in the Literature of Music (Cambridge: Cambridge University Press, 1984), 51–52.

[5] There is a recording of one such piece, Bocet, on *The Roumanian Flutes: Unpublished Documents Recorded on Location by Marcel Cellier* (MHS 3553; originally recorded by Arion–Paris).

[6] τελείου δὲ μέλους εἰκότως· χρὴ γὰρ καὶ μελῳδίαν θεωρεῖσθαι καὶ ῥυθμὸν καὶ λέξιν, ὅπως ἂν τὸ τέλειον τῆς ᾠδῆς ἀπεργάζηται· περὶ μὲν γὰρ μελῳδίαν ἁπλῶς ἡ ποιὰ φωνή, περὶ δὲ ῥυθμὸν ἡ ταύτης κίνησις, περὶ δὲ τὴν λέξιν τὸ μέτρον· τὰ δὲ περὶ μέλος τέλειον συμβαίνοντα κίνησις φωνῆς τε καὶ σώματος, ἔτι δὲ χρόνοι καὶ οἱ ἐκ τούτων ῥυθμοί (W.-I. 5.4–10). Mathiesen, *AQ on Music*, 75. Certain types of movements and gestures accompanied particular types of melos in order to produce precise effects. Some of these are described in general terms by Athenaeus, and

Melic composition (μελοποιία) together with rhythmic composition (ῥυθμοποιία) is the process of selecting and applying the various components of melos and rhythm to create a complete composition.[7] Melic composition is subdivided by Aristides Quintilianus into three classes: dithyrambic, nomic, and tragic; and these are parallel to his three classes of rhythmic composition: systaltic, diastaltic, and hesychastic. In addition, the three broad classes of melic composition may contain various subclasses, such as erotic, comic, and panegyric. By these classifications, Aristides Quintilianus would seem to be referring to music written in honor of Dionysus (dithyrambic) or Apollo (nomic) or for the tragedy. Any piece of music might be elevating (diastaltic), depressing (systaltic), or relaxing (hesychastic), as appropriate.[8]

Although the treatise of Aristides Quintilianus is rather late, his system of classification accords with the statements of earlier writers, and it is clear that from a very early period, the Greeks had developed a sophisticated musical typology. Forms might be typified by subject matter, rhythm and meter, large-scale structure, and so on. Plato's Athenian Stranger (*Leges* 3 [700a8–e4]) observes that the types were once distinct: a hymn would not be confused with a dirge, dithyramb, or paean. Nevertheless, he also clearly implies that this distinction was beginning to be lost by the middle of the fourth century B.C.E.

> Among us, at that time, music was divided into various classes and styles: one class of song was that of prayers to the gods, which bore the name of "hymns"; contrasted with this was another class, best called "dirges"; "paeans" formed another; and yet another was the "dithyramb," named, I fancy, after Dionysus. "Nomoi" also were so called as being a distinct class of song; and these were further described as "kitharoedic nomoi." So these and other kinds being classified and fixed, it was forbidden to set one kind of

---

they will be considered later in this chapter. The chronoi are the individual units of time from which rhythmic patterns are composed.

[7] According to Aristides Quintilianus *De musica* 1.12 and 19 (μελοποιία δὲ δύναμις κατασκευαστικὴ μέλους [W.-I. 28.10–11] and ῥυθμοποιία δέ ἐστι δύναμις ποιητικὴ ῥυθμοῦ [W.-I. 40.8]). The only work of modern scholarship to pay much attention at all to aspects of musical performance in ancient Greek poetry and drama is John Herington, *Poetry into Drama: Early Tragedy and the Greek Poetic Tradition*, Sather Classical Lectures, vol. 49 (Berkeley: University of California Press, 1985).

[8] Similar definitions are provided in Cleonides's *Harmonica introductio* 13 (Jan 206.3–18). See also Jon Solomon, "The Diastaltic Ethos," *Classical Philology* 76 (1981): 93–100.

> words to a different class of melos. ... but later on, with the progress of time, there arose as leaders of unmusical illegality poets who, though by nature poetical, were ignorant of what was just and lawful for the Muse; and they, being frenzied and unduly possessed by a spirit of pleasure, mixed dirges with hymns and paeans with dithyrambs, and imitated aulos music with kithara music, and blended every kind of music with every other; and thus, through their folly, they unwittingly bore false witness against music, as a thing without any standard of correctness, of which the best criterion is the pleasure of the auditor, be he a good man or a bad.[9]

A similar point is made in Plato's *Respublica* 4 (424b5–c6), where Socrates argues against innovations in music because they threaten the fundamental structure of the state: "One must be cautious about changing to a new type of music as this risks a change in the whole. The modes [τρόποι] of music are never moved without movement of the greatest constitutional laws."[10]

By Plato's remarks, we are reminded that all the practical manifestations of music form only one part of the Greek concept of music: music (μουσική) was considered both an art and a science. Music occupied a prominent place in everyday life not only because it was amusing and socially valuable but also because it embodied larger universal principles and was a vehicle for higher understanding.

Writers such as Plato and even Aristides Quintilianus restrict themselves to relatively general descriptions of musical types.

---

[9] διῃρημένη γὰρ δὴ τότε ἦν ἡμῖν ἡ μουσικὴ κατὰ εἴδη τε ἑαυτῆς ἄττα καὶ σχήματα, καί τι ἦν εἶδος ᾠδῆς εὐχαὶ πρὸς θεούς, ὄνομα δὲ ὕμνοι ἐπεκαλοῦντο· καὶ τούτῳ δὴ τὸ ἐναντίον ἦν ᾠδῆς ἕτερον εἶδος, θρήνους δέ τις ἂν αὐτοὺς μάλιστα ἐκάλεσε· καὶ παίωνες ἕτερον, καὶ ἄλλο Διονύσου γ' αἴνεσες, οἶμαι, διθύραμβος λεγόμενος. νόμους τε αὐτὸ τοῦτο τοὔνομα ἐκάλουν, ᾠδὴν ὥς τινα ἑτέραν· ἐπέλεγον δὲ κιθαρῳδικούς. τούτων δὴ διατεταγμένων καὶ ἄλλων τινῶν οὐκ ἐξῆν ἄλλῳ εἰς ἄλλο καταχρῆσθαι μέλους εἶδος. ... μετὰ δὲ ταῦτα προϊόντος τοῦ χρόνου ἄρχοντες μὲν τῆς ἀμούσου παρανομίας ποιηταὶ ἐγίγνοντο φύσει μὲν ποιητικοί, ἀγνώμονες δὲ περὶ τὸ δίκαιον τῆς Μούσης καὶ τὸ νόμιμον, βακχεύοντες καὶ μᾶλλον τοῦ δέοντος κατεχόμενοι ὑφ' ἡδονῆς, κεραννύντες δὲ θρήνους τε ὕμνοις καὶ παίωνας διθυράμβοις, καὶ αὐλῳδίας δὴ ταῖς κιθαρῳδίαις μιμούμενοι καὶ πάντα εἰς πάντα ξυνάγοντες, μουσικῆς ἄκοντες ὑπ' ἀνοίας καταψευδόμενοι, ὡς ὀρθότητα μὲν οὐκ ἔχοι οὐδ' ἡντινοῦν μουσική, ἡδονῇ δὲ τῇ τοῦ χαίροντος, εἴτε βελτίων εἴτε χείρων ἂν εἴη τις, κρίνοιτο ὀρθότητα (*Platonis opera,* 5 vols., ed. J. Burnet [Oxford: Clarendon, 1900–1907], 700a8–e4). Translation adapted from R. G. Bury, trans., *Plato in Twelve Volumes,* volumes 10–11, *Laws,* Loeb Classical Library (Cambridge: Harvard University Press, 1926), 10:245, 247.

[10] εἶδος γὰρ καινὸν μουσικῆς μεταβάλλειν εὐλαβητέον ὡς ἐν ὅλῳ κινδυνεύοντα· οὐδαμοῦ γὰρ κινοῦνται μουσικῆς τρόποι ἄνευ πολιτικῶν νόμων τῶν μεγίστων .... (424c3–6). On the term τρόπος, see pp. 533–35, 550, and 595 *infra.*

Fuller typologies are preserved in the *Deipnosophistae* of Athenaeus and the *Bibliotheca* of Photius, sources that tend, by their nature, to be lexicographic or museographic.[11] Section 239 of the *Bibliotheca*, which preserves a summary of Proclus's *Chrestomathia*,[12] provides a description of various musical types. After distinguishing between music intended for the gods and music intended for human activity, Proclus then lists the types associated with each classification.

> Concerning melic poetry, he [Proclus] says that it has a great many parts and different divisions. Some types of melic poetry are allotted to the gods, others to men, others to god and men, and still others to occurring circumstances. The types that refer to the gods are the hymn, the prosodion, the paean, the dithyramb, the nomos, adonidia, the iobakchon, and hyporchemata. The types that refer to men are encomia, the epinikon, skolia, erotica, epithalamia, hymenaioi, silloi, threnodies, and epikedeia. The types that refer to gods and men are parthenia, daphnephorika, tripodephorika, oschophorika, and eutika; these types written for the gods also include panegyrics for men. The types that refer to occurring circumstances are not species of melic poetry, but they have been employed by the same poets; of these, there are pragmatika, emporika, apostolika, gnomologika, georgika, and epistaltika.[13]

---

[11] On the *Deipnosophistae*, see n. 2 *supra*. The *Bibliotheca* was probably written somewhat before the middle of the ninth century C.E. Photius (ca. 810–893) was Patriarch of Constantinople during the negotiations that led to the schism of the Eastern and Western churches. The 280 sections of his *Bibliotheca* provide a summary and commentary on books that he had read—and thus a sort of catalogue of extant materials. In section 167 of the *Bibliotheca*, Photius refers to Stobaeus's *Eclogae*, in which are preserved the ancients' views "on geometry, on music, and on arithmetic" (περὶ γεωμετρίας καὶ μουσικῆς καὶ ἀριθμητικῆς) and "on dialectic, rhetoric, grammar, and poetics" (περὶ διαλεκτικῆς, καὶ περὶ ῥητορικῆς, καὶ περὶ λόγου καὶ γραμμάτων, περὶ ποιητικῆς [*Photii Bibliotheca*, 2 vols., ed. Immanuel Bekker (Berlin: Reimer, 1824–25), 113a4–5 and 9–11]). A long list of authors appears, including Aristoxenus, Archytas, Euclid, Nicomachus, Pythagoras, Plutarch, Porphyrius, Philolaus, Proclus, and many others.

[12] Proclus (410/12–485 C.E.) was a neo-Platonist philosopher and systematizer of ancient learning. In addition to the *Chrestomathia*, he wrote commentaries on Plato's *Timaeus*, *Respublica*, and *Parmenides*; scientific works; and an important summary of neo-Platonic metaphysics, the *Elementa theologica*.

[13] Περὶ δὲ μελικῆς ποιήσεώς φησιν ὡς πολυμερεστάτη τε καὶ διαφόρους ἔχει τομάς. Ἃ μὲν γὰρ αὐτῆς μεμέρισται θεοῖς, ἃ δὲ ⟨ἀνθρώποις, ἃ δὲ θεοῖς καὶ⟩ ἀνθρώποις, ἃ δὲ εἰς τὰς προσπιπτούσας περιστάσεις. Καὶ εἰς θεοὺς μὲν ἀναφέρεσθαι ὕμνον, προσόδιον, παιᾶνα, διθύραμβον, νόμον, ἀδωνίδια, ἰόβακχον, ὑπορχήματα. Εἰς δὲ ἀνθρώπους ἐγκώμια, ἐπίνικον, σκόλια, ἐρωτικά, ἐπιθαλάμια, ὑμεναίους, σίλλους, θρήνους, ἐπικήδεια. Εἰς θεοὺς δὲ καὶ ἀνθρώπους παρθένια, δαφνηφορικά, τριποδηφορικά, ὠσχοφορικά, εὐκτικά· ταῦτα γὰρ εἰς θεοὺς γραφόμενα καὶ ἀνθρώπων

It is impossible to know whether this particular typology would have been shared by earlier Greek writers, but it is clear the Greeks were conscious of specific musical types and their distinctions. Proclus's classification and typology supplies a useful model for examining each form.

Types of Music and Their Function

Music for the Gods

Hymns, paeans, prosodia, dithyrambs, and other types addressed to specific gods played an essential role in religious and civic life. They not only contributed a sense of grandeur and festivity to particular occasions but also provided a means for the cultural heritage to be preserved, interpreted, and communicated. As has already been noted, the tradition of these venerable types was particularly important to conservative philosophers such as Plato because they saw it as fundamental to social structure. At the same time, the tradition made these types important to innovators because it was worthy of renewal. In each type—and especially in the nomos, the dithyramb, and the drama—a certain tension between conservative and progressive styles becomes apparent.[14]

Hymn

Like their modern counterparts, hymns (ὕμνοι) are metric compositions addressed, directly or indirectly, to a god. They could be quite extended, or they might function rather like a prelude to another composition. As early as the *Iliad*, in a passage (1.472–74) widely quoted in Greek musical writings, an extended choral hymn to Apollo (παιών) is described:

> All day long they propitiated the god with singing,
> chanting a splendid hymn to Apollo, these young Achaians,
> singing to the one who works from afar, who listened in gladness.[15]

περιείληφεν ἐπαίνους. Τὰ δὲ εἰς τὰς προσπιπτούσας περιστάσεις οὐκ ἔστι μὲν εἴδη τῆς μελικῆς, ὑπ' αὐτῶν δὲ τῶν ποιητῶν ἐπικεχείρηται· τούτων δέ ἐστι πραγματικά, ἐμπορικά, ἀποστολικά, γνωμολογικά, γεωργικά, ἐπισταλτικά (Bekker 319b32–320a8).

[14] For a brief survey of this issue, see Hermann Abert, "Musik und Politik im klassischen Altertum," *Neue Musikzeitung* 45 (1924): 3–7.

[15] οἱ δὲ πανημέριοι μολπῇ θεὸν ἱλάσκοντο | καλὸν ἀείδοντες παιήονα, κοῦροι 'Αχαιῶν, | μέλποντες ἑκάεργον· ὁ δὲ φρένα τέρπετ' ἀκούων (Homer, *Ilias*, 2d ed., ed. and trans. Hans Rupé [Freising: Ernst Heimeran, 1961], 30). Also quoted in [Ps.] Plutarch *De musica* 1131e1–3 (ed. K. Ziegler and M. Pohlenz, *Plutarchi moralia*,

Hymns generally include numerous laudatory epithets; a description of some of the god's deeds and characteristics, as appropriate to the occasion; and a concluding prayer. As the rather large number of surviving hymns makes clear, they are perhaps the most important as well as the earliest formal musical type, at least in part because they combined didactic, devotional, and inspirational roles.

Proclus's *Chrestomathia*, despite a rather tenuous etymological description of the term, emphasizes the primacy of the type and provides important details on the manner of performance:

> And he [Proclus] says that "hymn" takes its name from being something that remains and, as it were, from calling to memory and recollection the deeds of those being hymned; or from celebrating them, i.e., to speak of them. In general, they call hymns everything written to the higher beings; therefore, they seem to oppose distinguishing the prosodion and the other aforementioned types from the hymn as species with respect to the genus. And so from these same writers, one hears "hymn of prosodion," "hymn of encomion," "hymn of paean," and the like. It is said to be a prosodion when they process to the altars or temples, and in processing, it was sung to the accompaniment of the aulos. But the hymn, properly speaking, was sung to the accompaniment of the kithara while they stood.[16]

The etymology, which is obscured in English translation, is based on the similarities of the words ὕμνος (hymn), ὑπόμονον (something that remains), ὑπόμνησις (recollection), and ὕδειν (to celebrate).

---

vol. VI/3 [Leipzig: B. G. Teubner, 1966], 2.13–15). Translation by Richmond Lattimore, *The Iliad of Homer* (Chicago: University of Chicago Press, 1951), 71.

[16] Καί φησι τὸν ὕμνον μὲν ὠνομάσθαι ἀπὸ τοῦ ὑπόμονόν τινα εἶναι καὶ οἷον εἰς μνήμην καὶ ὑπόμνησιν ἄγειν τὰς πράξεις τῶν ὑμνουμένων, ἢ ἀπὸ τοῦ ὕδειν αὐτάς, ὅπερ ἐστὶ λέγειν. Ἐκάλουν δὲ καθόλου πάντα τὰ εἰς τοὺς ὑπερόντας γραφόμενα ὕμνους· διὸ καὶ τὸ προσόδιον καὶ τὰ ἄλλα τὰ προειρημένα φαίνονται ἀντιδιαστέλλοντες τῷ ὕμνῳ ὡς εἴδη πρὸς γένος· καὶ γὰρ ἔστιν αὐτῶν ἀκούειν γραφόντων ὕμνος προσοδίου, ὕμνος ἐγκωμίου, ὕμνος παιᾶνος καὶ τὰ ὅμοια. Ἐλέγετο δὲ τὸ προσόδιον ἐπειδὰν προσίωσι τοῖς βωμοῖς ἢ ναοῖς, καὶ ἐν τῷ προσιέναι ᾔδετο πρὸς αὐλόν· ὁ δὲ κυρίως ὕμνος πρὸς κιθάραν ᾔδετο ἑστώτων (Bekker 320a9–20, as emended in Photius, *Bibliothèque*, 8 vols., ed. René Henry [Paris: Les Belles Lettres, 1959–1977], 159–60). A similar definition appears in the *Etymologicon magnum*, s.v. ὕμνος (777.1–10), a tenth-century Byzantine lexicon (there are a number of editions, but citations here are drawn from *Etymologicon magnum seu Magnum grammaticae penu*, ed. Friedrich Sylburg, new edition [Leipzig: Weigel, 1816]).

From a very early time, hymns must have been sung by a standing chorus,[17] but there are monodic examples as well. Hesiod refers on many occasions to the singing of hymns,[18] and in *Opera et dies* (654–62), he speaks of winning a prize for his solo performance of a hymn at the games of Amphidamas in Chalcis:

> Then I crossed over to Chalcis, to the games of the wise Amphidamas where the sons of the great-hearted king proclaimed and appointed prizes. And there, I tell you, I gained the victory with a hymn and carried off a tripod with handles, which I dedicated to the Muses of Helicon, in the place where they first set me in the way of clear-sounding song. Such is all my experience of many-pegged ships; nevertheless, I will tell you the will of Zeus who holds the aegis; for the Muses have taught me to sing a most marvelous hymn.[19]

At some point, the hymn also became a stylized literary type; the so-called Homeric Hymns, for example, formed a part of the aristocratic epic tradition and were perhaps delivered by professional singers (rhapsodes) at the festivals.

Pausanias (fl. 150 C.E.) refers to a number of early hymnographers in his *Graeciae descriptio*, including Olen, Pamphus, Orpheus, Musaeus, and Homer, and although hymns exist in other meters, Pausanias considers the hexameter to be the more ancient meter.[20] Lyric hymns, including monodic pieces by

---

[17] The chorus includes not only the group of singers but also a leader (ἐξάρχων). Although the chorus stood, some limited movement was probably employed. See Lillian B. Lawler, *The Dance in Ancient Greece* (Middletown, Conn.: Wesleyan University Press, 1964), 99–100.

[18] In the *Theogonia*, lines 11, 33, 37, 48, 51, 70, and 101; and in the *Opera et dies*, line 2. Absolute dates are not known for Hesiod, but he flourished ca. 700 B.C.E. (see M. L. West, "Hesiod," in *OCD*, 700).

[19] ἔνθα δ' ἐγὼν ἐπ' ἄεθλα δαΐφρονος 'Αμφιδάμαντος | Χαλκίδα [τ'] εἰσεπέρησα· τὰ δὲ προπεφραδμένα πολλὰ | ἄεθλ' ἔθεσαν παῖδες μεγαλήτορες· ἔνθα μέ φημι | ὕμνῳ νικήσαντα φέρειν τρίποδ' ὠτώεντα. | τὸν μὲν ἐγὼ Μούσῃσ' 'Ελικωνιάδεσσ' ἀνέθηκα | ἔνθα με τὸ πρῶτον λιγυρῆς ἐπέβησαν ἀοιδῆς. | τόσσον τοι νηῶν γε πεπείρημαι πολυγόμφων· | ἀλλὰ καὶ ὣς ἐρέω Ζηνὸς νόον αἰγιόχοιο· | Μοῦσαι γάρ μ' ἐδίδαξαν ἀθέσφατον ὕμνον ἀείδειν (*Hesiodi opera*, ed. F. Solmsen [Oxford: Clarendon, 1970]). Translation adapted from Hugh G. Evelyn-White, ed. and trans., *Hesiod: The Homeric Hymns and Homerica*, Loeb Classical Library (London: Heinemann, 1920), 51.

[20] *Pausaniae Graeciae descriptio*, 3 vols., ed. F. Spiro (Leipzig: B. G. Teubner, 1903). For an English translation, see Pausanias, *Description of Greece*, 5 vols., trans. W. H. S. Jones and H. A. Ormerod, Loeb Classical Library (Cambridge: Harvard University Press, 1931–35). Pausanias 10.7.3 asserts that Hesiod was

Archilochus, Alcaeus, and Sappho, and choral compositions by Pindar and Bacchylides later began to supplant the hexameters, which did survive, however, in more formal religious contexts.

Olen, who may be a partly mythic figure, came from Lycia and composed the first hymns sung at the Delos sanctuary of Apollo and Artemis. Pausanias regards him as the first prophet of Apollo and the first epic poet; the additional attribute of hymnographer underscores the significance of this type.[21] Orpheus and Musaeus are often related in legend, and both are associated with the lyre and with the cult of Apollo. Except in the most general terms, it is not possible to consider the structure or character of the works of these figures because the hymns—and indeed all the music—of this period were almost certainly not written or notated. Rather, compositions evolved through a process of patterned repetition and were communicated aurally.[22]

If the stylistic details must remain obscure, some general characterizations can be deduced from works such as the Plutarchean dialogue *De musica*.[23] Onesicrates, the preceptor of the dialogue, echoes Plato's *Respublica* 10 (607a) when he observes that it is a principal occupation of men to sing hymns to the gods (ὑμνεῖν θεούς), and he then invites Lysias, one of the speakers, to recount the achievements of early musicians. Lysias, quoting from the

---

debarred from the Pythian games because he could not accompany himself on the kithara.

[21] See Pausanias 10.5.8 (and 1.18.5; 2.13.3; 5.7.8; 8.21.3; and 9.27.2); Herodotus *Historiae* 4.35 (11 vols., ed. Ph.-E. Legrand [Paris: Les Belles Lettres, 1930–60]). He is also known as Dymaeus or Hyperboreios.

[22] Henderson, "Ancient Greek Music," 336–38. For a general summary of the oral tradition, see Oliver Taplin, "Homer," in *The Oxford History of the Classical World* (hereafter *OHCW*), ed. John Boardman, Jasper Griffin, and Oswyn Murray (Oxford: Oxford University Press, 1986), 65–72. Martin L. West, "The Singing of Homer and the Modes of Early Greek Music," *Journal of Hellenic Studies* 101 (1981): 115, draws the parallel between Homeric singing and that of the Ṛgveda, as well as observing the tradition of oral instruction. See also Arnold Bake, "The Music of India," in *Ancient and Oriental Music*, ed. Egon Wellesz, New Oxford History of Music, vol. 1 (London: Oxford University Press, 1957), 201–4.

[23] Although this dialogue was ascribed to Plutarch (ca. 50–ca. 120 C.E.) in the Planudean corpus, modern scholarship does not consider it an authentic work. Nevertheless, like other early museographic works, it does contain a wealth of excerpts from earlier treatises that do not otherwise survive. A full account of the treatise is contained in chapter 5.

writings of Heraclides Ponticus, Glaucus of Rhegium, Aristoxenus, and Alexander, attributes various musical types to particular musicians, in some cases rather different from those credited by Pausanias.[24]

Heraclides, according to Lysias, asserts in his *Collectio* that poetry was, from the first, sung to the accompaniment of the kithara, and he credits the famous mythic kitharode Amphion with its earliest development, as well as referring to numerous other figures and specific compositions. In particular, Anthes of Anthedon in Boeotia is noted as a composer of hymns. Heraclides observes that these early compositions were not written in free diction and without meter, but were like those of Stesichorus and used the epic meter, dactylic hexameter.[25] The surviving fragments of Stesichorus's choral lyrics exhibit a vivid diction in dactylo-epitritic meter (e.g., ×–⏑–––⏑⏑–⏑⏑–) and suggest that they were large-scale narrative works.[26] If Heraclides's comparison is accurate, early hymns might also have made use of the traditional triadic scheme for choral lyrics, that is, sets consisting of strophe, antistrophe, and epode, with the epode providing a link to the ensuing set.[27]

The Homeric Hymns provide more specific examples of the general characteristics thus far adduced.[28] Thirty-three of these in dactylic hexameters have been preserved, of varying lengths. Three of them are addressed to Dionysus; three to Aphrodite; two each to Hermes, Apollo, Athena, Artemis, and Demeter; and individual hymns to figures such as Ares, Hera, Asclepius, Pan, Hestia, and others. Most of the hymns end by addressing the god once again and stating "I shall remember you and another song."[29] While this may suggest that these hymns functioned as preludes to another composition, it may also simply indicate that a singer will always sing again another day. There are indeed compositions specifically noted by Lysias in the Plutarchean *De musica* (1132d) as preludes (προοίμια), but these are not hymns; rather, they are a distinct musical type associated with Terpander.

---

[24] Lysias's sources are all authors of the fourth century B.C.E. Nearly every ancient historian differs when assigning particular pieces or types to specific figures, but in their descriptions of the characteristics of pieces or types, they tend to be rather consistent.

[25] Plutarch *De musica* 1131f–1132c (Ziegler 3.9–25)=Heraclides fr. 157. The writings of Heraclides survive as fragments in various later sources; they are collected in Fritz Wehrli, *Herakleides Pontikos*, 2d ed., Die Schule des Aristoteles, vol. 7 (Basel: Schwabe, 1969).

[26] Stesichorus was probably active during the first half of the sixth century B.C.E. The *Suda*—a historical and literary encyclopedia compiled sometime in the late tenth century C.E.—states that his name was actually Teisias; Stesichorus may have been a title of some sort. His works were originally collected in twenty-six books. See P. J. Parsons, "Stesichorus," in *OCD*, 1442–43.

[27] For a brief treatment of this form, see L. P. E. Parker, "Metre, Greek," in *OCD*, 970–75.

[28] The hymns are not by the author of the *Iliad* and the *Odyssey*, and they range in date perhaps from the eighth century to the sixth century B.C.E. The hymns are edited in T. W. Allen, W. R. Halliday, and E. E. Sikes, *The Homeric Hymns*, 2d ed. (Oxford: Clarendon, 1936). See also Evelyn-White, *Hesiod*.

Thucydides includes two quotations from the hymn *In Apollinem* as part of his description of the use of hymns in the festival at Delos, but the hymns themselves make it clear that they were performed in competitions at various festivals, which were, of course, associated with religious celebration.[30] Musical allu-

---

[29] For example, from the hymn *In Mercurium*: αὐτὰρ ἐγὼ καὶ σεῖο καὶ ἄλλης μνήσομ' ἀοιδῆς (Allen et al., 580); or, from the hymn *In Venerem*: σεῦ δ' ἐγὼ ἀρξάμενος μεταβήσομαι ἄλλον ἐς ὕμνον (Allen et al., 293–94).

[30] *Historiae* 3.104. As the various national festivals are noted throughout this chapter, a brief explanation of the cycle (περίοδος) is in order here.

The four principal festivals are the Olympia, Pythia, Isthmia, and Nemea. Although these games were associated with funeral ceremonies in their earliest forms, the Olympian and Nemean games came to be held in honor of Zeus, the Pythian games in honor of Apollo, and the Isthmian games in honor of Poseidon. The Olympian Festival was held in August every fourth year, and the other games fell at specific points within each Olympiad. The Pythia was held in August in the third year, while Nemean and Isthmian festivals followed both the Olympian and the Pythian in the succeeding July and April. Thus the seventy-sixth Olympiad began with the Olympian Festival in August, 476 B.C.E.; the Nemean Festival followed in July, 475 B.C.E.; the Isthmian in April, 474 B.C.E.; the Pythian in August, 474 B.C.E.; a second Nemean in July, 473 B.C.E.; and a second Isthmian in April, 472 B.C.E. Then, the seventy-seventh Olympiad began in August, 472 B.C.E., and the cycle continued.

The festival at Delos—which was the legendary birthplace of Apollo and Artemis—included song, dance, and games; it may have begun as early as the eighth century B.C.E. In 426 B.C.E., a new quinquennial festival was instituted.

For a short and concise treatment of the festivals, see Sir J. E. Sandys's Introduction to *The Odes of Pindar, including the Principal Fragments*, rev. ed., Loeb Classical Library (Cambridge: Harvard University Press, 1937), xxii–xxx; and the articles on each festival in the *OCD*. For a more thorough treatment of the sions are frequently included, as in this passage from the hymn *In Apollinem*:

> Leto's all-glorious son goes to rocky Pytho, playing on his hollow phorminx, clad in divine, perfumed garments; and at the touch of his golden plectrum, his phorminx sings sweet. Thence, swift as a thought, he speeds from earth to Olympus, to the house of Zeus, to join the gathering of the other gods: then straightway the undying gods turn to song and the music of the kithara, and all the Muses together, voice sweetly answering voice, hymn the unending gifts the gods enjoy and the sufferings of men, ... And among them sings one, not mean nor puny, but tall to look upon and enviable in mien, Artemis who delights in arrows, sister of Apollo. Among them frolic Ares and the keen-eyed Slayer of Argus, while Phoebus Apollo plays on the kithara stepping high and featly and a radiance shines around him, the gleaming of his feet and close-woven tunic. And they, even golden-tressed Leto and wise Zeus, rejoice in their great hearts as they watch their dear son playing among the undying gods.[31]

By nature, hymns provide descriptions of the deeds of the gods, and these may include the discovery or invention of musical instruments. In the hymn *In Mercurium*, an extended description of the construction of the tortoise-shell (i.e., chelys) lyre appears as part of the narrative of the birth of Hermes. First, there is the typical invocation that tells the listeners the subject of the hymn: "Muse, sing of Hermes, son of Zeus and Maia, ruler of Cyllene and Arcadia with its many flocks, luck-bringing messenger of the gods, whom Maia bore, Maia the beautiful-haired nymph who mingled in love-making with Zeus." After the invocation, a brief

---

elaborate structure of Greek religion and the festivals, see Walter Burkert, *Greek Religion*, trans. John Raffan (Cambridge: Harvard University Press, 1985).

[31] Lines 182–206: εἶσι δὲ φορμίζων Λητοῦς ἐρικυδέος υἱὸς | φόρμιγγι γλαφυρῇ πρὸς Πυθὼ πετρήεσσαν, | ἄμβροτα εἵματ' ἔχων τεθυωμένα· τοῖο δὲ φόρμιγξ | χρυσέου ὑπὸ πλήκτρου καναχὴν ἔχει ἱμερόεσσαν. | ἔνθεν δὲ πρὸς Ὄλυμπον ἀπὸ χθονὸς ὥς τε νόημα | εἶσι Διὸς πρὸς δῶμα θεῶν μεθ' ὁμήγυριν ἄλλων· | αὐτίκα δ' ἀθανάτοισι μέλει κίθαρις καὶ ἀοιδή. | Μοῦσαι μέν θ' ἅμα πᾶσαι ἀμειβόμεναι ὀπὶ καλῇ | ὑμνεῦσίν ῥα θεῶν δῶρ' ἄμβροτα ἠδ' ἀνθρώπων | τλημοσύνας, ὅσ' ἔχοντες ὑπ' ἀθανάτοισι θεοῖσι | ζώουσ' ἀφραδέες καὶ ἀμήχανοι, οὐδὲ δύνανται | εὑρέμεναι θανάτοιό τ' ἄκος καὶ γήραος ἄλκαρ· | αὐτὰρ ἐϋπλόκαμοι Χάριτες καὶ ἐΰφρονες Ὧραι | Ἁρμονίη θ' Ἥβη τε Διὸς θυγάτηρ τ' Ἀφροδίτη | ὀρχεῦντ' ἀλλήλων ἐπὶ καρπῷ χεῖρας ἔχουσαι· | τῇσι μὲν οὔτ' αἰσχρὴ μεταμέλπεται οὔτ' ἐλάχεια, | ἀλλὰ μάλα μεγάλη τε ἰδεῖν καὶ εἶδος ἀγητὴ | Ἄρτεμις ἰοχέαιρα ὁμότροφος Ἀπόλλωνι. | ἐν δ' αὖ τῇσιν Ἄρης καὶ ἐΰσκοπος Ἀργειφόντης | παίζουσ'· αὐτὰρ ὁ Φοῖβος Ἀπόλλων ἐγκιθαρίζει | καλὰ καὶ ὕψι βιβάς, αἴγλη δέ μιν ἀμφιφαείνει | μαρμαρυγαί τε ποδῶν καὶ ἐϋκλώστοιο χιτῶνος. | οἱ δ' ἐπιτέρπονται θυμὸν μέγαν εἰσορόωντες | Λητώ τε χρυσοπλόκαμος καὶ μητίετα Ζεὺς | υἷα φίλον παίζοντα μετ' ἀθανάτοισι θεοῖσι (Allen et al. 182–206). Translation adapted from Evelyn-White, *Hesiod*, 337–39.

outline of the hymn, which runs to 580 lines, is provided by the poet to pique the interest of his listeners:

> For then she bore a son of many wiles, a cunning deceiver, a thief, a cattle-driver, a bringer of dreams, a spy in the night, a watcher at the gates, who would soon show forth wonderful deeds among the immortal gods. He was born at daybreak; at noon he played on the kithara, and in the evening he stole the cattle of far-shooting Apollo, ...

The poet then tells of Hermes finding a tortoise (χέλυς), returning with it to his dwelling, and constructing his lyre:

> Then he up-ended it, and with a grey iron chisel he scooped out the life of the mountain tortoise. ... He cut stalks of reed to measure and fixed them, fastening them by the ends through the back of the tortoise's shell. Then he stretched oxhide over it by his skill, and added arms, with a crossbar fixed across the two of them; and he stretched seven consonant strings of sheepgut. When he had made it, he picked up the lovely toy and tried it part by part with a plectrum. Under his hand it rang out awesomely. The god sang to it beautifully, trying out improvisations, like young men mocking each other with taunts at a feast.[32]

Paean

The paean was originally a special type of hymn addressed to Apollo, Artemis, Zeus, Dionysus, Asclepius, or Hygieia. Proclus's *Chrestomathia* once again provides a brief definition of the type:

> The paean is a species of song now written for all the gods. But in ancient times, it was specifically assigned to be sung to Apollo and Artemis for the

---

[32] Lines 1–5, 13–18, 41–42, 47–56: Ἑρμῆν ὕμνει Μοῦσα Διὸς καὶ Μαιάδος υἱόν, | Κυλλήνης μεδέοντα καὶ Ἀρκαδίης πολυμήλου, | ἄγγελον ἀθανάτων ἐριούνιον, ὃν τέκε Μαῖα | νύμφη ἐϋπλόκαμος Διὸς ἐν φιλότητι μιγεῖσα | αἰδοίη· . . . | . . .
καὶ τότ' ἐγείνατο παῖδα πολύτροπον, αἱμυλομήτην, | ληϊστῆρ', ἐλατῆρα βοῶν, ἡγήτορ' ὀνείρων, | νυκτὸς ὀπωπητῆρα, πυληδόκον, ὃς τάχ' ἔμελλεν | ἀμφανέειν κλυτὰ ἔργα μετ' ἀθανάτοισι θεοῖσιν. | ἠῷος γεγονὼς μέσῳ ἤματι ἐγκιθάριζεν, | ἑσπέριος βοῦς κλέψεν ἑκηβόλου Ἀπόλλωνος, | . . .
ἔνθ' ἀναπηλήσας γλυφάνῳ πολιοῖο σιδήρου | αἰῶν' ἐξετόρησεν ὀρεσκῴοιο χελώνης. | . . .
πῆξε δ' ἄρ' ἐν μέτροισι ταμὼν δόνακας καλάμοιο | πειρήνας διὰ νῶτα διὰ ῥινοῖο χελώνης. | ἀμφὶ δὲ δέρμα τάνυσσε βοὸς πραπίδεσσιν ἑῇσι, | καὶ πήχεις ἐνέθηκ', ἐπὶ δὲ ζυγὸν ἤραρεν ἀμφοῖν, | ἑπτὰ δὲ συμφώνους ὀΐων ἐτανύσσατο χορδάς. | αὐτὰρ ἐπεὶ δὴ τεῦξε φέρων ἐρατεινὸν ἄθυρμα | πλήκτρῳ ἐπειρήτιζε κατὰ μέλος, ἡ δ' ὑπὸ χειρὸς | σμερδαλέον κονάβησε· θεὸς δ' ὑπὸ καλὸν ἄειδεν | ἐξ αὐτοσχεδίης πειρώμενος, ἠΰτε κοῦροι | ἡβηταὶ θαλίῃσι παραιβόλα κερτομέουσιν | . . . (Allen et al., 1–5, 13–18, 41–42, 47–56). Translation adapted from Barker, *Greek Musical Writings*, 1:42–43. For a fuller analysis of this hymn, see Maarit Kaimio, "Music in the Homeric Hymn to Hermes," *Arctos: Acta philologica Fennica* 8 (1974): 29–42.

> cessation of plagues and maladies. Some, using the term improperly, say that prosodia are paeans.[33]

As Proclus suggests, the type is also applied to military hymns; hymns composed in honor of an important event, such as the ratification of a treaty; and, later, hymns addressed to prominent persons. At least two of these types appear in the *Iliad*: in Book I, in a passage noted earlier,[34] the term appears in connection with a hymn sung to Apollo as a propitiation for the Greek army's offence against the god; and in Book XXII, the term is used to describe a piece sung in celebration of a victory (391–94). In addition, the Homeric hymn *In Apollinem* preserves the famous cry of the Cretan paean-singers, "Ie Paean," which they use as an epithet for Apollo in his role as healer:

> And when they [the Cretan sailors] had put away craving for drink and food, they started out with the lord Apollo, the son of Zeus, to lead them, holding a phorminx in his hands, and playing sweetly as he stepped with fine high steps. So the Cretans followed him to Pytho, marching in time as they sang "Ie paean" after the manner of the Cretan paean-singers and of those in whose hearts the heavenly Muse has put sweet-voiced song.[35]

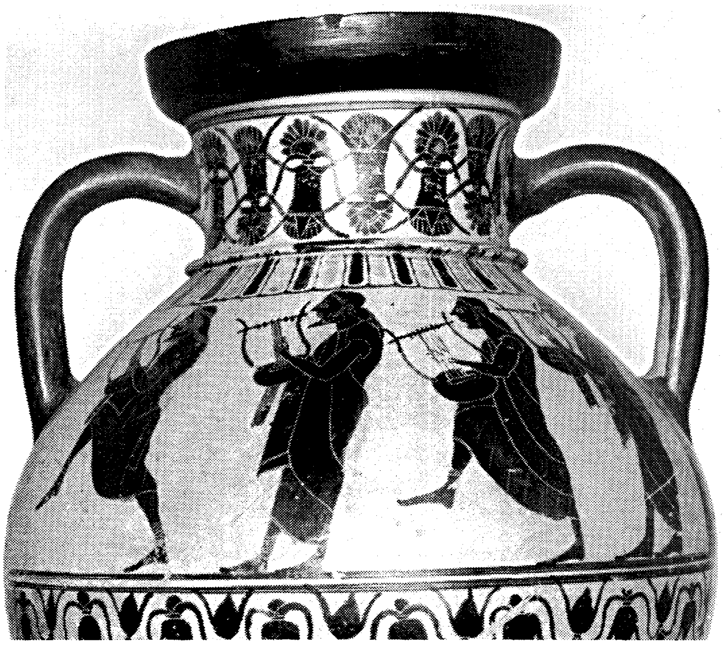
This excerpt illustrates once again the unity of music, text, and movement that is so important to the musical culture of the Greeks. Vase painters frequently portray scenes similar to those described in the literary sources, and a sense of the "fine high steps" described in this hymn may be gathered from the painting on a mid-sixth century belly amphora (figure 1) preserved in the Louvre (Paris, Musée du Louvre, E 861).

---

[33] Ὁ δὲ παιάν ἐστιν εἶδος ᾠδῆς εἰς πάντας νῦν γραφόμενος θεούς, τὸ δὲ παλαιὸν ἰδίως ἀπενέμετο τῷ Ἀπόλλωνι καὶ τῇ Ἀρτέμιδι ἐπὶ καταπαύσει λοιμῶν καὶ νόσων ᾀδόμενος. Καταχρηστικῶς δὲ καὶ τὰ προσόδιά τινες παιᾶνας λέγουσιν (Bekker 320a21–25).

[34] See n. 15 *supra*.

[35] Lines 513–19: αὐτὰρ ἐπεὶ πόσιος καὶ ἐδητύος ἐξ ἔρον ἕντο, | βάν ῥ' ἴμεν· ἦρχε δ' ἄρα σφιν ἄναξ Διὸς υἱὸς Ἀπόλλων, | φόρμιγγ' ἐν χείρεσσιν ἔχων, ἐρατὸν κιθαρίζων, | καλὰ καὶ ὕψι βιβάς· οἱ δὲ ῥήσσοντες ἕποντο | Κρῆτες πρὸς Πυθὼ καὶ ἰηπαιήον' ἄειδον, | οἷοί τε Κρητῶν παιήονες, οἷσί τε Μοῦσα | ἐν στήθεσσιν ἔθηκε θεὰ μελίγηρυν ἀοιδήν (Allen et al., 513–19). Translation adapted from Evelyn-White, *Hesiod*, 361. This passage is also noted by Lawler, *Dance*, 100–101.



© photographie Musée du Louvre—M. et P. Chuzeville

Figure 1.

Lysias, in the course of his survey of the Spartan musical pioneers, refers to Thaletas, Xenodamus, Xenocritus, and Pindar[36] as composers of paeans, but he also makes it clear that there was some disagreement about the precise distinction between a paean and a hyporcheme. In the works of Pindar, however, he maintains that the distinction is clear,[37] and indeed, a fragment perhaps from one of Pindar's threnodies does indicate the poet's awareness of generic distinctions:

> There are songs of paeans, coming in due season, which belong to the children of Leto of the golden distaff. There are also songs that, from amid the crowns of flourishing ivy, long for the dithyramb of Dionysus; but in another song did three goddesses lull to rest the bodies of their sons. One hymns a dirge

---

[36] Thaletas (seventh century B.C.E.) was born at Gortyn in Crete. In response to a Delphic oracle, he went to Sparta, where he used his music to cure the people of a pestilence (Plutarch *De musica* 1146b–c [Ziegler 35.24–28]). Xenodamus from Cythera and Xenocritus from Locri (both seventh century B.C.E.) were prominent Spartan musicians. Together with Thaletas, Polymnestus, and Sacadas, they were credited with the introduction of the Gymnopaediai (Plutarch *De musica* 1134b–c [Ziegler 8.9–27]). Pindar (518–438 B.C.E.), from Cynoscephalae (near Thebes) in Boeotia, was the most celebrated of all the lyric poets. He was a student of his uncle Skopelinus, his father Daïphantus, and especially Linus of Hermione. For a fuller biographical sketch, see Christopher Carey, "Pindar," in *OCD*, 1183–84.

[37] Plutarch *De musica* 1134c–d (Ziegler 8.20–27)=Heraclides fr. 157.

> for clear-voiced Linus, another sings in her newest hymns for Hymenaios (whom Fate seized when he first lay touching another in wedlock), ...[38]

Another Pindar fragment, which once again associates the paean with Apollo, provides a further example of the extent to which the musical texts contain self-conscious references to details of the composition:

> To the rival Ionian Muse, a song and a *harmonia* for the *auloi* were devised by one of the Locrians who live by the white-crested hill of Zephyrion, a shining city beyond the Ausonian headland. And he uttered aloud, like a clear-sounding chariot, a complete paean fit for Apollo and the Graces. Hearing him play his few notes, and busying myself with my loquacious art, I am roused to rival his song, like a dolphin of the sea, moved by the lovely melody of the *auloi* in the flood of the waveless ocean.[39]

Several paeans are counted among the surviving musical fragments, including the two famous examples from the Athenian treasury. The first paean, by an anonymous author,[40] is preserved in a series of fragments from the south wall of the Treasury of the Athenians at Delphi. It most probably dates from the Pythian Festival of 138 B.C.E.[41] Thirty-three lines survive, in addition to some fragments of uncertain location. The verse is composed in cretics (–⏑–) and paeonics, which exist in four forms: –⏑⏑⏑, ⏑–⏑⏑, ⏑⏑–⏑, and ⏑⏑⏑–. In a sense, the paeonics result from one of the longs of the cretic being resolved into short syllables and the short syllables being contracted into longs. Aristides Quintilianus, in fact, identifies the paeonic with the cretic and describes this procedure:

---

[38] Threni, fr. 128c1–9: Ἔντι μὲν χρυσαλακάτου τεκέων Λατοῦς ἀοιδαί | ὥ[ρ]ιαι παιάνιδες· ἐντὶ [δὲ καί] | θάλλοντος ἐκ κισσοῦ στεφάνων {ἐκ} Διο[νύσου | . [... ... .μ]αιόμεναι· τὸ δὲ κ̣ο̣ι̣[..]αν | τ̣ρεῖς [desunt ca. 15ll.] σ̣ώ̣μ̣α̣τ̣’ ἀποφθιμένων· | ἁ μὲν ἀχέταν Λίνον αἴλινον ὕμνει, | ἁ δ’ Ὑμέναιον, ⟨ὂν⟩ ἐν γάμοισι χροϊζόμενον | [Μοῖρα] σύμπρωτον λάβεν, | ἐσχάτοις ὕμνοισιν· (*Pindari Carmina cum fragmentis,* part 2, 4th ed. by H. Maehler [Leipzig: B. G. Teubner, 1975]). Translation adapted from Sandys, *Odes of Pindar,* 595. Barker, *Greek Musical Writings,* 1:61 provides a slightly different translation (as fragment 126); see also his explanatory notes.

In all the transcriptions, brackets indicate parts of the text lost through physical damage to the extant source (sometimes filled with editorial conjectures or dots indicating the approximate amount of missing text), sublinear dots indicate uncertain transcription, and braces indicate editorial deletion.

[39] Fragmenta incertorum librorum, fr. 140b1–15: Ἰων[| ἀοιδ[ὰν κ] α̣ὶ ἁρμονίαν | αὐλ[οῖς ἐ]πεφράσ[ατο | τῶ[ν τε Λο]κρῶν τις, [οἵ τ’ ἀργίλοφον] | π[ὰρ Ζεφυρί]ου κολῶ[ναν] | ν[...ὑπὲ]ρ Αὐσονία[ς ἁλός | λι[......]ις ἀνθ.[| οἷον [ὄ]χημα λιγ[υ | κες ὀ[.]όν παιηο [ν | Ἀπόλλωνί τε καὶ [| ἄρμενον. ἐγὼ μ[| παῦρα μελ[ι]ζομεν[| [γλώ]σσαργον ἀμφέπω[ν [ἐρεθίζ]ομαι πρὸς ἀϋτά [ν | [ἁλίο]υ δελφῖνος ὑπ[όκρισιν] (Maehler, pt. 2). Barker, *Greek Musical Writings,* 1:60–61 (as fragment 125); see also his explanatory notes. The paeans of Pindar are conveniently collected and translated in Sandys, *Odes of Pindar,* 518–51.

[40] But see chapter 1, n. 9.

[41] Delphi Inv. Nr. 517, 526, 494, 499. Discussion and transcription in Pöhlmann, *Denkmäler,* 58–67; Bélis, *Deux hymnes,* 47–83; and Théodore Reinach, *Les Hymnes delphiques à Apollon avec notes musicales* (Paris: Fontemoing, 1912) =*Fouilles de Delphes* 3, no. 2 (1909–13): 147–69, 332.

> The paeonic is also called the cretic because it is sometimes measured by pure paeons, sometimes by cretics. It is augmented as far as tetrameter. Some have also postulated pentameters. These are produced by the fourth pure paeon, which, by contracting the two middle shorts into a long, they often make a bacchic from the pure bacchic; or, by resolving the final long into two shorts, they make the same thing from all shorts, preserving only the close of the verse as a fourth paeon because of the seemliness of the long at the close.[42]

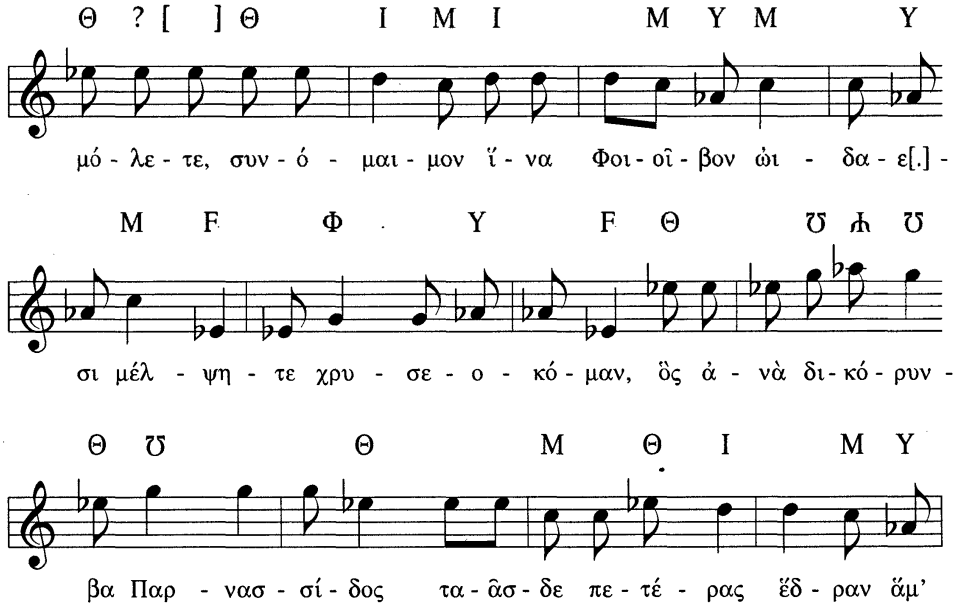
These rhythms appear in texts surviving with or without musical notation, but in poetic texts with musical notation, the rhythms sometimes result from reduplication of vowels or diphthongs. Thus, the music itself may produce rhythmic patterns that complement—or alter—the rhythmic-metric structure apparent in the text alone. This characteristic, which is also attested by theorists such as Dionysius of Halicarnassus and Augustine, could well have been a prominent feature of any of the musical types. When the poetic texts began to be copied without the music, this feature disappeared, and the importance of the music to an articulation of the rhythmic-metric structure was forgotten.[43]

---

[42] Τὸ δὲ παιωνικὸν καλεῖται μὲν καὶ κρητικὸν διὰ τὸ ποτὲ μὲν τοῖς παίωσι καθαροῖς, ποτὲ δὲ τοῖς κρητικοῖς μετρεῖσθαι· αὔξεται δὲ μέχρι τετραμέτρου· τινὲς δὲ καὶ πεντάμετρα πεποιήκασιν. γίνεται δὲ ταῦτα καὶ διὰ τοῦ τετάρτου παίωνος καθαροῦ, οὗ πολλάκις ἤτοι τὰς δύο μέσας βραχείας συνάγοντες εἰς μακρὰν διὰ βακχείου καθαροῦ ποιοῦσι βακχειακὸν ἢ τὴν τελευταίαν μακρὰν εἰς δύο βραχείας λύοντες δι' ὅλων βραχειῶν ταὐτοποιοῦσι τὴν κατακλεῖδα μόνην τέταρτον παίωνα τηροῦντες διὰ τὸ τῆς μακρᾶς εἰς ἀνάπαυσιν εὐπρεπές (W.-I. 50.20–29). Mathiesen, *AQ on Music,* 111–12. Cf. Hephaestion, *Enchiridion cum commentariis veteribus,* ed. M. Consbruch (Leipzig: B. G. Teubner, 1906; reprint, Stuttgart: B. G. Teubner, 1971), §13. In another location (1.17), Aristides Quintilianus defines the cretic **rhythm** as: –⏑|–⏑.

[43] See, for example, Dionysius of Halicarnassus *De compositione verborum* 11 and 15 (in W. Rhys Roberts, ed. and trans., *Dionysius of Halicarnassus On Literary Composition* [London: Macmillan, 1910; reprint, New York: AMS Press, 1976]); and Augustine *De musica* 2.1; 3.1, 8; and 4.17 (text and Italian translation in Giovanni Marzi, *Aurelii Augustini de musica,* Collana di classici della filosofia

Lines 3–5 of the paean provide examples of the rhythms and syllabic reduplication.[44]


Θ ?[ ]Θ I M I M Y M Y
μό - λε - τε, συν - ό - μαι - μον ἴ - να Φοι - οῖ - βον ὠι - δα - ε[.] -
M F Φ Y F Θ Ʊ ሐ Ʊ
σι μέλ - ψη - τε χρυ - σε - ο - κό - μαν, ὃς ἀ - νὰ δι - κό - ρυν -
Θ Ʊ Θ M Θ I M Y
βα Παρ - νασ - σί - δος τα - ᾶσ - δε πε - τέ - ρας ἕδ - ραν ἅμ'

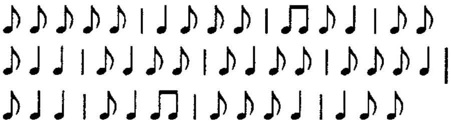
---

cristiana, no. 1 [Florence: Sansoni, 1969]). Dionysius of Halicarnassus flourished after 30 B.C.E.; Augustine lived from 354 to 430 C.E.

The extent to which the music itself influenced the rhythm and meter of poetic texts is a matter of considerable controversy. The absence of reduplicated vowels in poetic texts copied without musical notation (for whatever reason) led later scholars to develop highly complex theories of meter to account for irregular patterns. In most cases where the musical notation survives, however, the rhythmic patterns and meter are clear and rather straightforward. For a general review of the issue, see Thomas J. Mathiesen, "Rhythm and Meter in Ancient Greek Music," *Music Theory Spectrum* 7 (1985): 159–80; Lionel Pearson, "The Dynamics of Pinder's Music: Ninth Nemean and Third Olympian," *Illinois Classical Studies* 2 (1977): 54–69; and Aristoxenus, *Elementa rhythmica: The Fragment of Book II and the Additional Evidence for Aristoxenian Rhythmic Theory*, edited with introduction, translation, and commentary by Lionel Pearson (Oxford: Clarendon, 1990).

[44] The principles of Greek notation, described in the tables of Alypius and other sources, enable relatively secure transcription of the musical fragments. Although these principles will not be discussed until chapter 6 (pp. 593–605 *infra*), I have thought it advisable to include some transcriptions in this chapter to illustrate various points. The barlines in the following transcription, which differs only slightly from Pöhlmann's (*Denkmäler*, 59), have been inserted to match the metric feet of the poetry; they should not be taken to indicate any particular musical meter.

In addition to the cretics and paeonics, bacchic feet (⏑––) appear at the beginnings of lines 4 and 5. The reduplicated vowels (as in ταᾶσδε) or diphthongs (as in Φοιοῖβον) in this text have not been scanned twice as separate elements in the rhythm, although they do play such a role in the compositions of Euripides. Here, it seems, they serve as indications that a long syllable is to be resolved into two short notes. Thus, the actual rhythm of these lines (but not their meter) differs slightly from the rhythm that would appear in a simple textual scansion:



compared to

⏑⏑⏑⏑⏑|–⏑⏑⏑|–⏑–|⏑⏑
⏑––|⏑–⏑⏑|⏑–⏑⏑|⏑⏑⏑–
⏑––|⏑––|⏑⏑⏑–|–⏑⏑

The paean appears to be structured in at least three of the typical sections: an invocation to the Muses, a laudatory epithet to Attica, and a description of some of the deeds of Apollo. The three sections are further articulated by modulations between the Phrygian and Hypophrygian tonoi.[45]

Translation of the text depends in part on the conjectural reconstruction of the missing or damaged sections of the stone, but its general sense and elevated tone are clear.

Paean or Hyporcheme to the God, which [.........] Athenian

> Hear me, you who possess deep-wooded Helicon, fair-armed daughters of Zeus the magnificent! Fly to beguile with your accents your brother, golden-tressed Phoebus who, on the twin peak of this rock of Parnassus, escorted by illustrious maidens of Delphi, sets out for the limpid streams of Castalia, traversing, on the Delphic promontory, the prophetic pinnacle.
>
> Behold glorious Attica, nation of the great city which, thanks to the prayers of the Tritonid warrior, occupies a hillside sheltered from all harm. On the holy altars Hephaestos consumes the thighs of young bullocks; mingled with the flames, the Arabian vapor rises towards Olympus. The shrill roaring lotus plays a song with coiling mele, and the golden kithara, the sweet-sounding kithara, accompanies the hymns.
>
> And all the artists, dwellers in Attica, hymn your glory, god, famed for playing the kithara, son of great Zeus, beside this snow crowned peak, O you who reveal to all mortals the eternal and infallible oracles. They sing how you conquered the prophetic tripod guarded by a fierce dragon when, with your darts you pierced the gaudy, tortuously coiling monster, so that, utter-

---

[45] On tonos, see pp. 322, 334, 372, 384–88, 409–10, 450–51, 455–66, 473–77, 482–89, 507–9, 533–37, 572, and 595–603 *infra*.

> ing many fearful hisses, the beast expired. They sing too, how the Gallic hordes, in their sacrilegious impiety, when trying to cross ....[46]

Like the Homeric hymn *In Mercurium*, the second section is typical in its use of specific musical references. "The shrill roaring lotus" refers to the sound of the aulos, which was noted for its complex melodic lines—or "coiling mele"—, and this characteristically exciting sound is contrasted to the "sweet-sounding kithara," Apollo's instrument, which accompanies the hymns. The third section of the fragment refers to the contest between Apollo and the Python, recalling the description of the Pythic Nomos preserved in Strabo's *Geographica*.[47]

If the reconstruction of the third word ([τεχνι]|τ̣ωῶν) in the first sentence of the third section is correct, it perhaps refers to the Athenian guild of the Artists of Dionysus (σύνοδοι τῶν περὶ τὸν Διόνυσον τεχνιτῶν), which came to play an important role in the Pythian games at Delphi, or to the boys' choir, which was led by Elpinikos and Cleon, both members of the guild. Other surviving Delphic inscriptions indicate that the choir of the Artists of Dionysus numbered between forty and sixty performers accompanied by kitharists and auletes, and the final sentence of the second section strongly suggests this as the ensemble that would have performed the paean.[48]

---

[46] [παιὰν καὶ ὑπόρχημα] ε̣ἰς τὸν Θεὸν ὃ ἐ̣[πόησε ..... || [col. II] . Ἀθ]ηναῖος.

[col. I] Κέκλυθ' Ἑλι]κ̣ῶνα βαθύδενδρον αἳ λά|[χετε, Διὸ]ς̣ ἐ[ρι]βρόμουου θύγατρες εὐώλ[ενοι,] | μόλετε, συνόμαιμον ἵνα Φοιοῖβον ὠιδαε[ῖ]|σι μέλψητε χρυσεοκόμαν, ὃς ἀνὰ δικόρυν|βα Παρνασσίδος ταᾶσδε πετέρας ἕδραν ἅμ' [ἀ]|γακλυταιεῖς Δεελφίσιιν Κασταλίδος | εοὐύδρου νάματ' ἐπινίσεται, Δελφὸν ἀνὰ | [πρ]ωῶνα μααντειεῖον ἐφέπων πάγον. | [Ἦν] κλυτὰ μεγαλόπολις Ἀθθίς, εὐχαιε|[ῖ]σι φερόπλοιο ναίουσα Τριτωωνίδος δά[πε]|δον ἄθραυστον· ἁγίοις δὲ βωμοιοῖσιν Ἅ|φαιστος αἰείθε⟨ι⟩ νέων μῆρα ταούρων· ὁμουοῦ δέ νιν Ἄραψ ἀτμὸς ἐς [Ὄ]λ[υ]μπον ἀνακίδν[α]|ται· λιγὺ δὲ λωτοὸς βρέμων αειόλοιοις μ̣[έ]|λεσιν ὠιδαὰν κρέκει· χρυσέα δ' ἀδύθρου[ς] [κί]|θαρις ὕμνοισιν ἀναμέλπεται. Ὁ δὲ [τεχνι]|τ̣ωῶν πρόπας ἑσμὸς Ἀθθίδα λαχὼ[ν] [τὸν κιθα|| [col. II] ρί]σει κλυτὸν παῖδα μεγάλο̣υ [Διὸς ὑμνοῦσί σε | παρ' ἀκρονι̇φῆ τόνδε πάγον, αἄμ[βροτ' ἀψευδέ'] | [ὃ]ς πᾶσι θνατοιοῖς προφαίνει[εις λόγια,] | [τρ]ίποδα μαντειεῖον ὡς ειεῖ[λες, ἐχθρὸς ὃν ἐ]|[φρ]ουούρειει δράκων, ὅτε τε[οῖσι βέλεσιν ἔ]|[τρ]ηησας αἰόλον ἑλικτὰν [φυάν, ἔσθ' ὁ θὴρ συχ]|[ν]ὰ̣ συυρίγμαθ' ιἱεὶς ἀθώπε[υτ' ἀπέπνευσ' ὁμῶς·] | [ὡς] δὲ Γαλαταᾶν ἄρης [βάρβαρος, τάνδ' ὃς ἐπὶ γαῖ]|[α]ν ἐπέρααισ' ἀσε̣πτ[ως, χιόνος ὤλεθ' ὑγραῖς βολ]|[αῖ]ς. Text from Pöhlmann, *Denkmäler*, 58 and 60; Reinach, *Les Hymnes delphiques*, 7–8, and D. Yeld, in *Musique de la Grèce antique*, Atrium musicae de Madrid, cond. Gregorio Paniagua (Harmonia mundi HM 1015) offer translations, but in both cases the musical allusions of the second section have been misunderstood.

[47] On Strabo, see pp. 24–25 *supra*.

The Pythian games centered around musical competitions in instrumental music, singing, drama, and recitation, and they always included one or more paeans to Apollo. By the third century B.C.E., the professional artists' guilds had supplanted the older tradition of the citizen-musician. The guilds included kitharists, auletes, singers, poets, actors, and composers, headed by a priest of Dionysus and other officers.[49] The guilds also functioned as a school of music and drama, as Inscription no. 3088 from Teos attests in providing the names of five courses: psalmos (ψαλμός), playing with the fingers on any stringed instrument; kitharismos (κιθαρισμός), playing the kithara, which is played with a plectrum; kitharodia (κιθαρῳδία), singing to the kithara; rhythmographia (ῥυθμογραφία), writing rhythms, which is probably identical to rhythmic composition; and melographia (μελογραφία), writing melos, presumably identical to melic composition.[50]

For the second paean, a more considerable title survives, including the name of the composer, Limenios. This paean was composed for the Pythian games of 128 B.C.E. in honor of the performers, the choir of the Artists of Dionysus.[51] Like the first paean, Limenios's composition is based on cretic and paeonic rhythms, and a number of reduplicated vowels are employed to resolve long syllables into short rhythms.

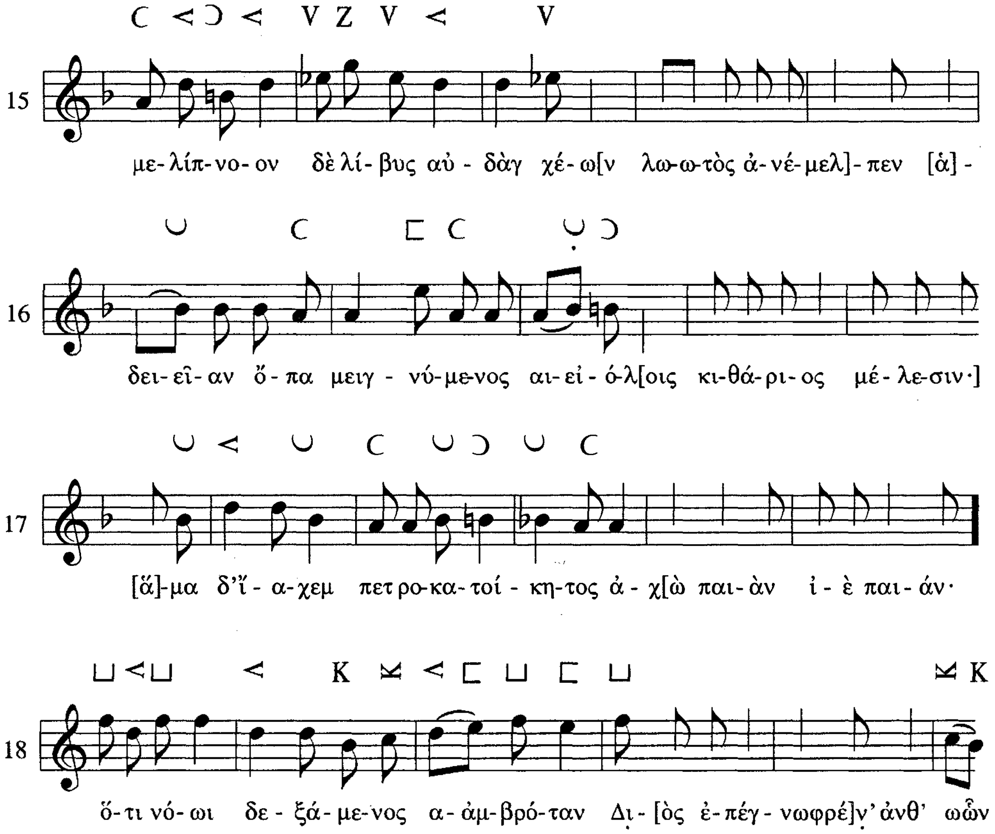
---

[48] Cf. Reinach, *Les Hymnes delphiques*, 1–2; and Pöhlmann, *Denkmäler*, 65. Inscription 2563 (*Sammlung der griechischen Dialekt-Inschriften*, 4 vols., ed. Hermann Collitz, Fritz Bechtel, A. Bezzenberger *et al.* [Göttingen: Vandenhoeck & Ruprecht, 1884–1915; reprint, Nendeln/Liechtenstein: Kraus, 1973]) lists two ῥαψῳδοί, two κιθαρισταί, two κιθαρῳδοί, five παῖδες χορευταί and five ἄνδρες χορευταί, two αὐληταί with accompanying διδάσκαλοι, three tragic teams (each with three τραγῳδοί, an αὐλητής, and a διδάσκαλος), four comic teams (each with three κωμῳδοί, an αὐλητής, and a διδάσκαλος), seven χορευταὶ κωμικοί, and three ἱματιομίσθαι. A general treatment of the Artists of Dionysus appears in Sir Arthur Pickard-Cambridge, *The Dramatic Festivals of Athens*, 2d ed. (Oxford: Clarendon, 1968), 279–305.

[49] Athenaeus *Deipnosophistae* 5.27 (198c). On the nature of the competitions, see W. J. Henderson, "Criteria in the Greek Lyric Contests." *Mnemosyne* 42 (1989): 24–40; and Orsamus Pearl, "Rules for Musical Contests," *Illinois Classical Studies* 3 (1978): 132–39.

[50] *Corpus inscriptionum graecarum*, 4 vols. and index, auctoritate et impensis Academiae litterarum regiae borussicae edidit Augustus Boeckhius (Berlin: ex Officina Academica, vendit G. Reimeri libraria, 1828-77; reprint, Hildesheim: Olms, 1977), 2:674–75.

Lines 15–18 of the paean provide examples of the rhythms and reduplication. Most of the right side of the stone is lost in these lines (as indicated by the [), and in each case, the passage would continue.[52]


C < Ɔ < V Z V < V
15
με-λίπ-νο-ον δὲ λί-βυς αὐ-δὰγ χέ-ω[ν λω-ω-τὸς ἀ-νέ-μελ]-πεν [ἀ]-
∪ C ⊏ C ∪ Ɔ
16
δει-εῖ-αν ὅ-πα μειγ-νύ-με-νος αι-ει-ό-λ[οις κι-θά-ρι-ος μέ-λε-σιν·]
∪ < ∪ C ∪ Ɔ ∪ C
17
[ἅ]-μα δ'ἴ-α-χεμ πετ ρο-κα-τοί-κη-τος ἀ-χ[ὼ παι-ὰν ἰ-ὲ παι-άν·
⊔ < ⊔ < K < ⊏ ⊔ ⊏ ⊔ K
18
ὅ-τι νό-ωι δε-ξά-με-νος α-ἀμ-βρό-ταν Δι-[ὸς ἐ-πέγ-νωφρέ]ν' ἀνθ' ωῶν

As in the first paean and for the same reason, the reduplicated vowels (as in αἀμβρόταν, line 18) or diphthongs (as in δειεῖαν or αιειόλ[οις, line 16) have not been scanned twice as separate elements in the rhythm. Thus, the actual rhythm of these lines (but not their meter) differs from the rhythm that would appear in a simple textual scansion:

---

[51] Delphi Inv. Nr. 489, 1461, 1591, 209, 212, 226, 225, 224, 215, 214. Discussion and transcription in Pöhlmann, *Denkmäler*, 64–76; but once again, see Bélis, *Deux hymnes*, and the edition by Reinach (*Les Hymnes delphiques*).

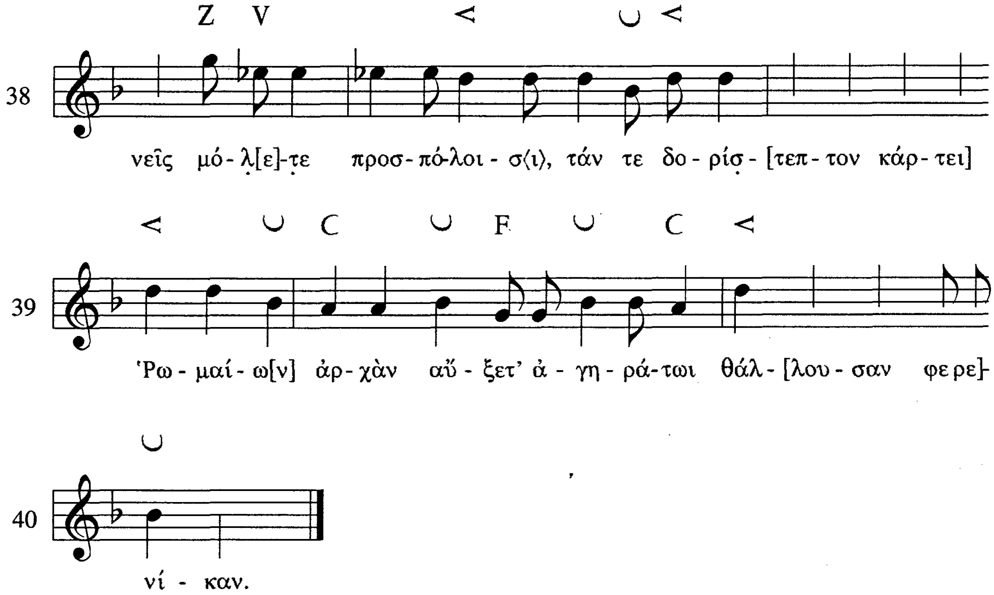
[52] In the scansion of these lines, I differ slightly from the interpretation in Pöhlmann, *Denkmäler*, 71. As in the earlier examples, the barlines in the following transcription have been inserted to match the metric feet of the poetry; they should not be taken to indicate any particular musical meter.

♪ ♪ ♪ ♩ | ♪ ♪ ♪ ♩ | ♩ ♪ ♩ |
♫ ♪ ♪ ♪ | ♩ ♪ ♪ ♪ | ♫ ♪ ♩ |
♪ ♪ | ♩ ♪ ♩ | ♪ ♪ ♪ ♩ | ♩ ♪ ♩ |
♪ ♪ ♪ ♩ | ♩ ♪ ♪ ♪ | ♫ ♪ ♩ | ♪

compared to

⏑⏑⏑–|⏑⏑⏑–|–⏑–| …
–⏑⏑⏑|–⏑⏑⏑|–⏑–| …
⏑⏑|–⏑–|⏑⏑⏑–|–⏑–| …
⏑⏑⏑–|–⏑⏑⏑|–⏑–|⏑ …

The paean itself extends to thirty-three lines, after which a *paragraphos* appears, marking a modulation to a new rhythmic structure and the beginning of a prosodion. In this section, the text is organized into eight-syllable cola of various patterns but with a stronger emphasis on long syllables,[53] as for example, in the last four cola, beginning with προσπόλοισ⟨ι⟩ in line 38:


Z V < ◡ <
38
νεῖς μό-λ[ε]-τε προσ-πό-λοι-σ⟨ι⟩, τάν τε δο-ρίσ-[τεπ-τον κάρ-τει]
< ◡ C ◡ F ◡ C <
39
Ῥω-μαί-ω[ν] ἀρ-χὰν αὔ-ξετ' ἀ-γη-ρά-τωι θάλ-[λου-σαν φερε]-
◡
40
νί-καν.

If this prosodion was intended to be sung as part of a procession at the end of the paean, as suggested by Proclus's *Chrestomathia*, it is conceivable that the eight-element pattern would have been realized in four groups of two: the long-short pairs forming triplets and the long-long pairs forming doublets.

---

[53] Modern metricians call this a glyconic meter. Aristides Quintilianus (*De musica* 1.28) considers a colon to be a group composed of at least two different meters (see Mathiesen, *AQ on Music*, 112–13).

In comparison to the earlier anonymous paean, a much greater portion of this paean survives, and it therefore provides an excellent example of the overall structure, rhythmic content, and tone of a paean as conceived in the second century B.C.E. Although conjectural reconstruction of the missing or damaged sections of the stone is once again necessary, the text and transcription (pp. 49–54) are reasonably certain.

Paean and Prosodion to the god, which Limenios, son of Thoinos, Athenian, composed and performed on the kithara.

[1] Come to these far-looking heights whence rises the double peak of Parnassus, dear to dances, and preside over my hymns, O Pierides, dwellers on the snowy rocks of Helicon. Come, sing the golden-haired Pythian, the master of the bow and the lyre, Phoebus, born of the blessed Leto beside the illustrious lake when, in her pangs, she touched with her hands the verdant bough of the glaucous olive tree. [lines 1–7]

[2] The celestial vault was filled with rejoicing, cloudless, radiant; in the lull of the air the winds stopped their impetuous flight; Nereus appeased the fury of his roaring floods; so did the great Ocean who, with his wet arms, envelops the earth. [lines 8–12]

[3] Then, leaving the Cynthian isle, the god came to the land of harvests, the noble Attic land, and stopped close to the steep hill of the Tritonid goddess. [lines 13–14]

[4] The Libyan lotus, pouring forth, hailed him with its honeyed song, mingling its sweet voice with the coiling mele of the kithara, and all at once, the echo that haunts the rock cried Paean! ié Paean! [lines 15–17]

[5] The god rejoiced; privy to the mind of his father, he recognized the immortal plan of Zeus. This is why, since that time, Paean has been invoked by us all, the autochthonous people, and by the sacred group of artists, sheltered by the city Cecrops, whom Bacchus struck with his thyrsis. [lines 18a–21]

[6] But, O master of the fateful tripod, on the way towards this crest of Parnassus, trodden by the gods, friend of holy ecstasies! [lines 21–23]

[7] It is there, your violet tresses girded by a laurel bough, that you dragged, O king, with your immortal hands, great blocks, foundations of your temple, when you saw yourself before the monstrous daughter of the earth. [lines 23–26]

[8] But, O son of Leto, god of the caressing, you pierce with your arrows the wild child of the earth, Tityus, for his desire of your mother. ... you killed the creature ... hissing from its lair ... [lines 26–30]

[9] So you watched, O lord, beside the sacred navel of the world when the barbarian horde, profaning your prophetic seat to plunder its treasures, perished, submerged in the tempest of snow. [lines 31–33]

[10] But, O Phoebus, protect the city of Pallas, founded by the gods and its noble people; you, too, O queen of the bows and the Cretan hounds, Artemis, and you, venerable Leto! Watch over the dwellers of Delphi so that they and their children, their spouses, their dwellings might be

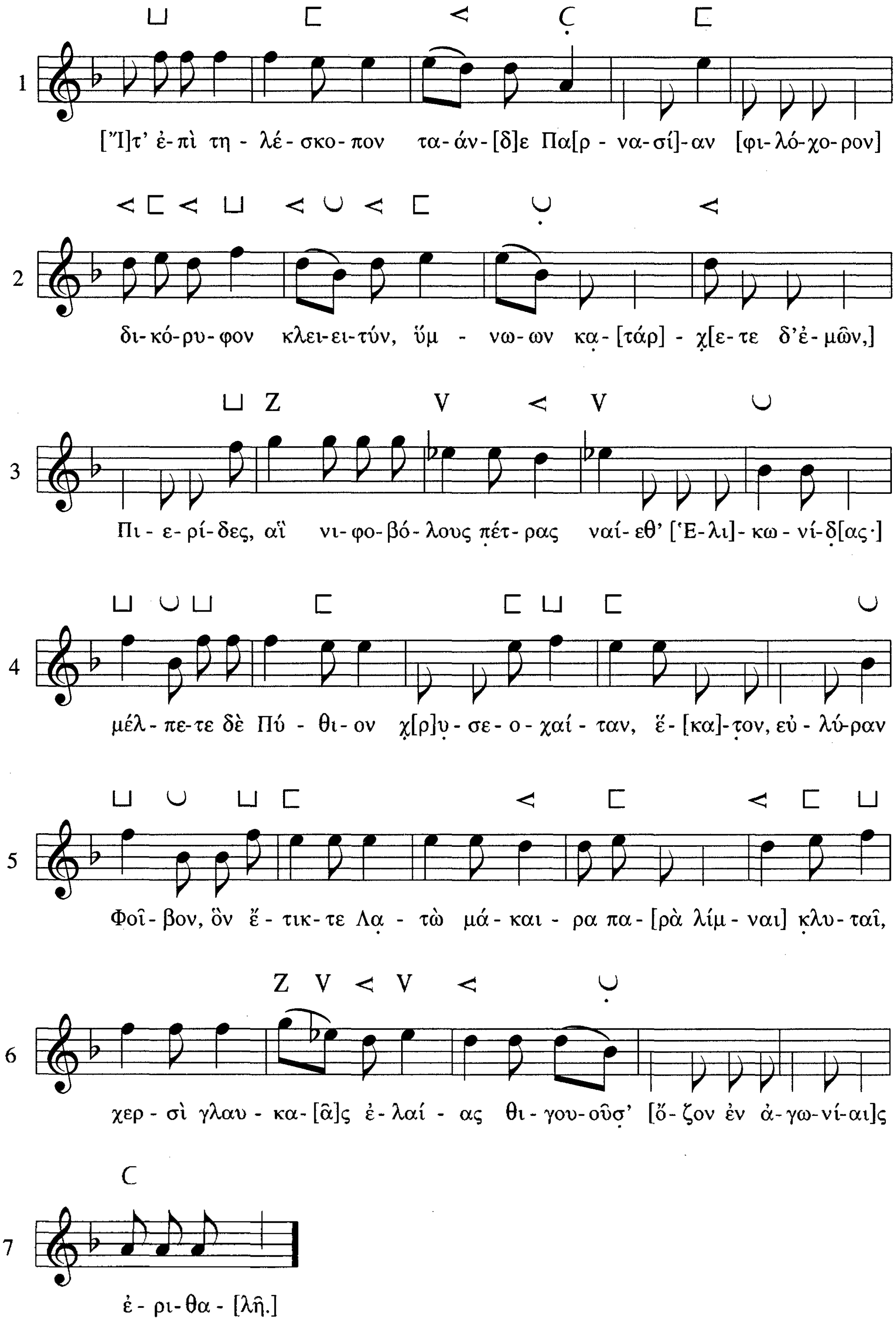
shielded from all harm! Look with a propitious eye upon the servants of Bacchus, victors in the sacred games! May, with your aid, the empire of the Romans, crowned with lances, ever flourishing in imperishable youth, grow and advance from victory to victory![54] [lines 33–40]

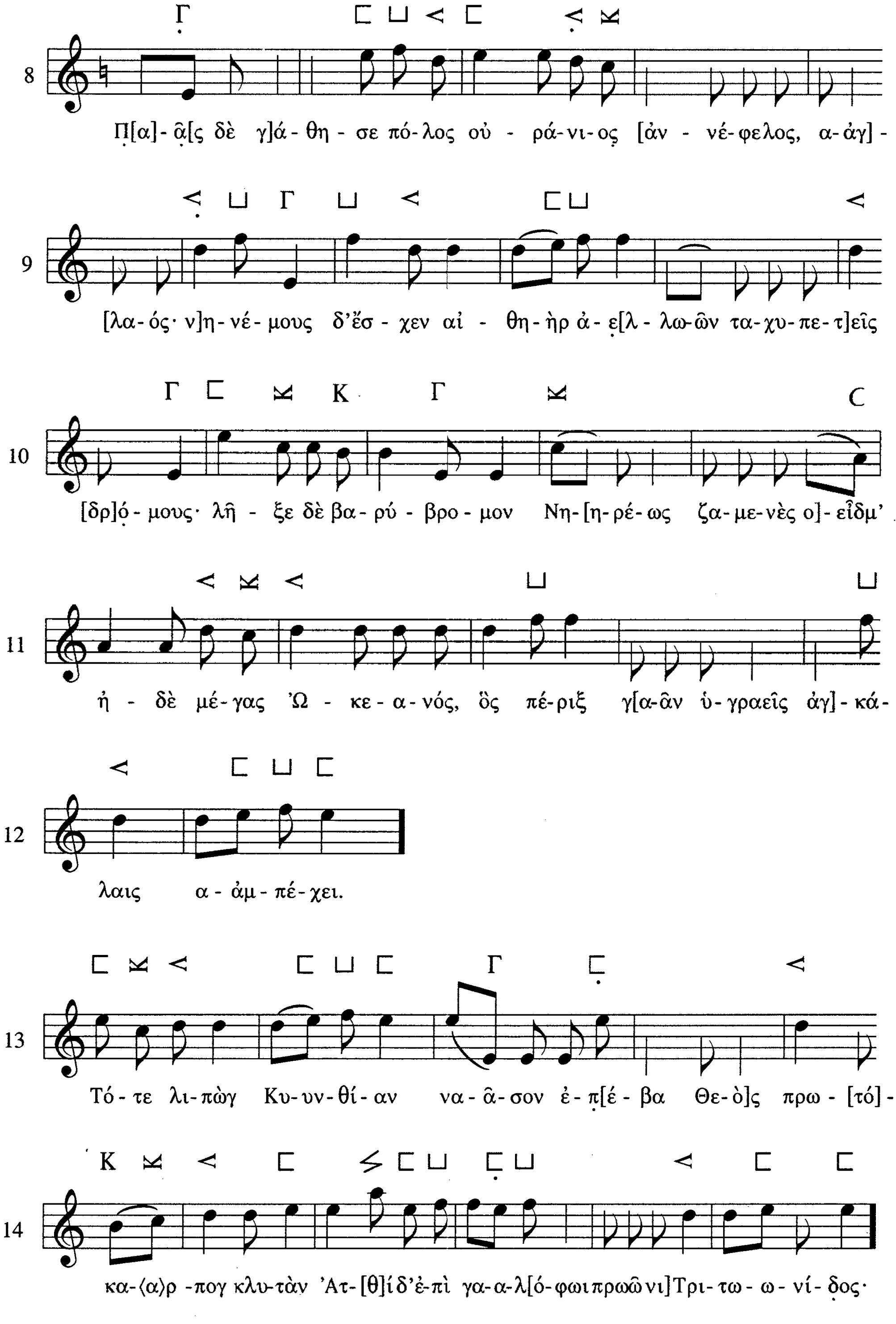
---

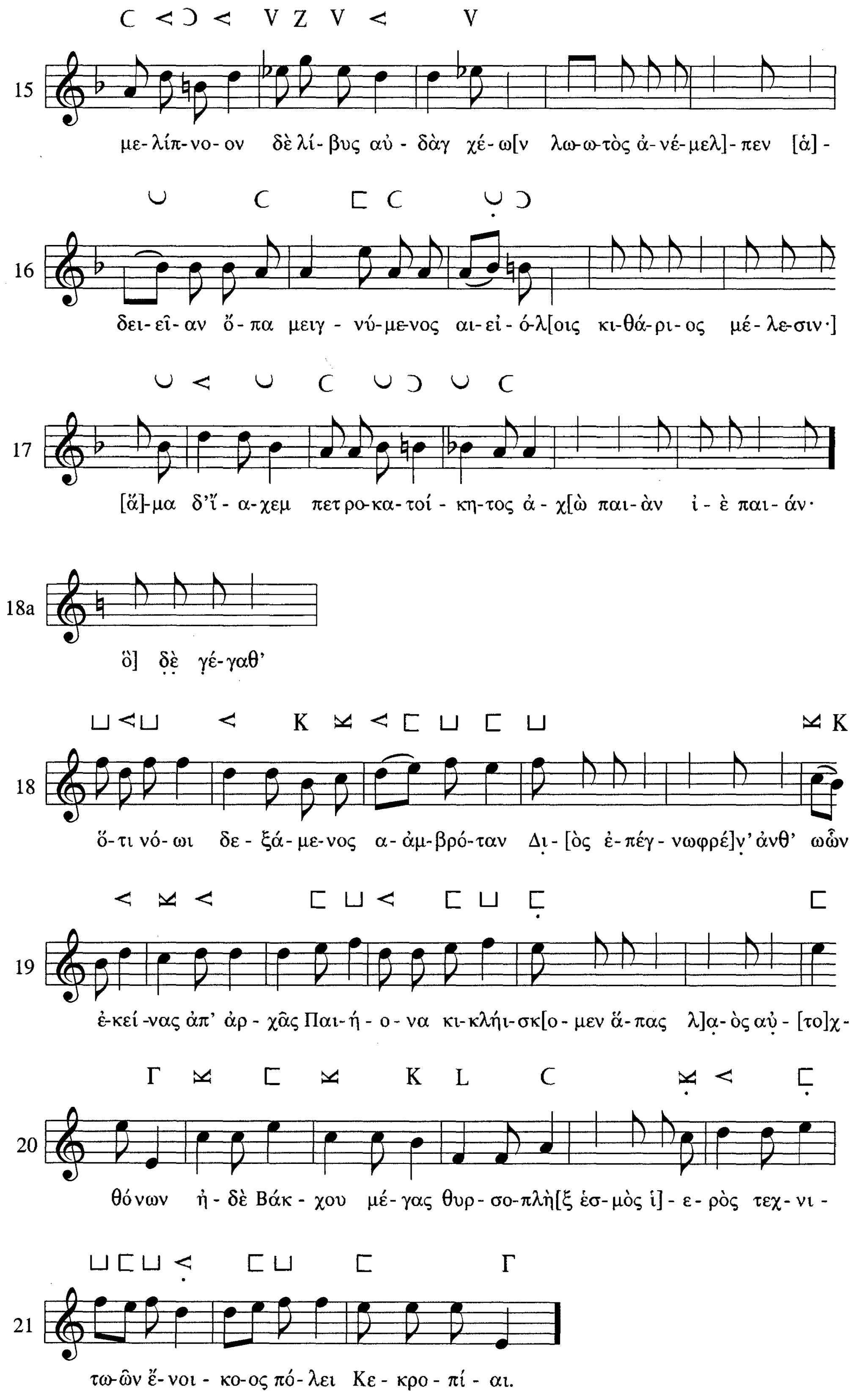
[54] [πα]ιὰν δὲ καὶ π[ροσό]διον εἰς τ[ὸν θεὸν ὃ ἐπό]ησε[ν καὶ προσεκιθάρι || [col. II] σε]ν Λιμήνι[ος Θ]οίνο[υ Ἀθηναῖος.]

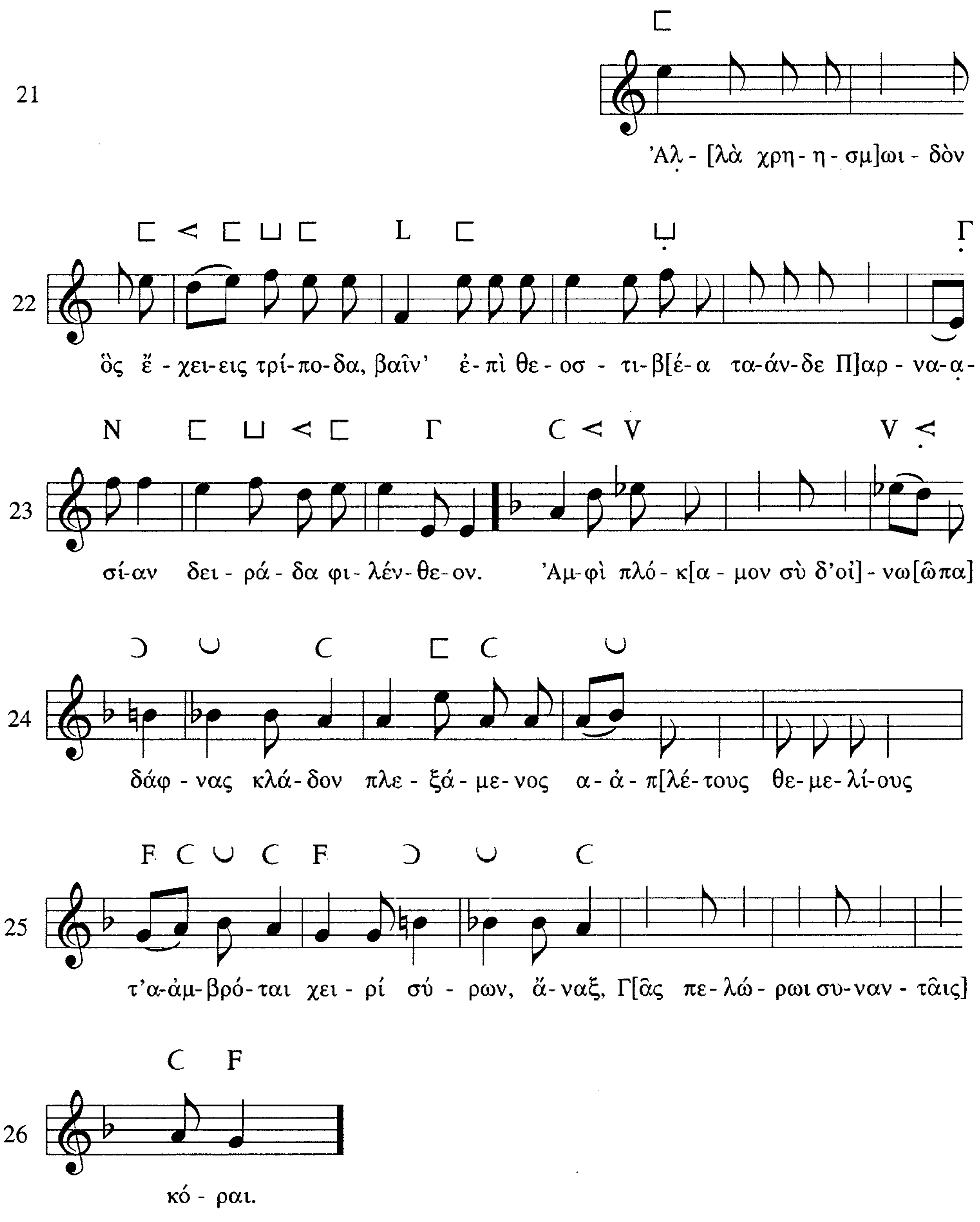
[col. I] [Ἴ]τ' ἐπὶ τηλέσκοπον ταάν[δ]ε Πα[ρνασί]αν [φιλόχορον] | δικόρυφον κλειειτύν, ὕμνωων κα[τάρ]χ[ετε δ' ἐμῶν,] | Πιερίδες, αἳ νιφοβόλους πέτρας ναίεθ' [Ἑλι]κωνίδ[ας·] | μέλπετε δὲ Πύθιον χ[ρ]υσεοχαίταν, ἕ[κα]τον, εὐλύραν | Φοῖβον, ὃν ἔτικτε Λατὼ μάκαιρα πα[ρὰ λίμναι] κλυταῖ, | χερσὶ γλαυκα[ᾶ]ς ἐλαίας θιγουοῦσσ' [ὄζον ἐν ἀγωνίαι]ς | ἐριθα[λῆ.] | Π[ά]ᾶ[ς δὲ γ]άθησε πόλος οὐράνιος [ἀννέφελος, ἀάγ]|[λαός· ν]ηνέμους δ' ἔσχεν αἰθὴρ ἀε[λλωῶν ταχυπετ]εῖς | [δρ]όμους· λῆξε δὲ βαρύβρομον Νη[ηρέως ζαμενὲς ο]εῖ|δμ' ἠδὲ μέγας Ὠκεανός, ὃς πέριξ γ[αᾶν ὑγραεῖς ἀγ]κά|λαις αἀμπέχει. | Τότε λιπὼγ Κυυνθίαν ναᾶσον ἐπ[έβα Θεὸ]ς πρω[τό]|κα⟨α⟩ρπογ κλυτὰν Ἀτ[θ]ίδ' ἐπὶ γααλ[όφωι πρωῶνι] Τριτωωνίδος· | μελίπνοον δὲ λίβυς αὐδὰγ χέω[ν λωωτὸς ἀνέμελ]πεν [ἁ]|δειεῖαν ὄπα μειγνύμενος αιειόλ[οις κιθάριος μέλεσιν·] | [ἅ]μα δ' ἴαχεμ πετροκατοίκητος ἀχ[ὼ παιὰν ἰὲ παιάν· ὃ] δὲ γέγα|θ' ὅτι νόωι δεξάμενος αἀμβρόταν Διὸς ἐπέγνω φρέ]ν'· ἀνθ' ωῶν | ἐκείνας ἀπ' ἀρχᾶς Παιήονα κικλήισκ[ομεν ἅπας λ]αὸς αὐ[το]|χθόνων ἠδὲ Βάκχου μέγας θυρσοπλὴ[ξ ἑσμὸς ἱ]ερὸς τεχνι|τωῶν ἔνοικοος πόλει Κεκροπίαι. – Ἀλ[λὰ χρηησμ]ωιδὸν | ὃς ἔχειεις τρίποδα, βαῖν' ἐπὶ θεοστιβ[έα ταάνδε Π]αρναα|σίαν δειράδα φιλένθεον. Ἀμφὶ πλόκ[αμον σὺ δ' οἰ]νω[ῶπα] | δάφνας κλάδον πλεξάμενος αἀπ[λέτους θεμελίους τ'] | αἀμβρόται χειρί σύρων, ἄναξ, Γ[ᾶς πελώρωι συναντᾶις] | κόραι. – Ἀλλὰ Λαατοῦς ἐρατογ[λέφαρον ἔρνος ἀγρ]|[ία]μ παῖδα Γα[ᾶς] τ' ἔπεφνες ἰοῖς, ὁ[μοίως τε Τιτυὸν ὅτι] ||[col. II] πόθον ἔσχε ματρός [| θηήρ, ἃ κατέκτ[α]ς, οσ[| [σ]υύριγμ' ἀπ' ε[ὐνω]ῶν [| [Εἶτ'] ἐφρούρε[ιεις] δὲ Γαᾶ[ς ἱερόν, ὦναξ, παρ' ὀμφαλόν, ὁ βάρ]|βαρος ἄρης ὅτε [τε]ὸμ μαντόσυ[νον οὐ σεβίζων ἕδος πολυκυ]|θὲς ληζόμενος ὤλεθ' ὑγρᾶι χι[όνος ἐν ζάλαι. – Ἀλλ', ὦ Φοῖβε,] | σῶιζε θεόκτισ{κ}τον Παλλάδος [ἄστυ καὶ λαὸν κλεινόν, σύν] | τε θεά, τόξων δεσπότι Κρησίω[ν κυνῶν τ' Ἄρτεμις, ἠδὲ Λατὼ] | κυδίστα· [κ]αὶ ναέτας Δελφῶν τ[ημελεῖθ' ἅμα τέκνοις, συμ]|βίοις, δώμασιν ἀπταίστους, Βάκχου [θ' ἱερονίκαισιν εὐμε]|νεῖς μόλ[ε]τε προσπόλοισ⟨ι⟩, τάν τε δορίσ[τεπτον κάρτει] | Ῥωμαίω[ν] ἀρχὰν αὔξετ' ἀγηράτωι θάλ[λουσαν φερε]|νίκαν. Text from Pöhlmann, *Denkmäler*, 68–74; Reinach, *Les Hymnes delphiques*, 16–17, and D. Yeld, in *Musique de la Grèce antique*, offer translations, but here again, in both cases, a number of the musical allusions have been misunderstood.

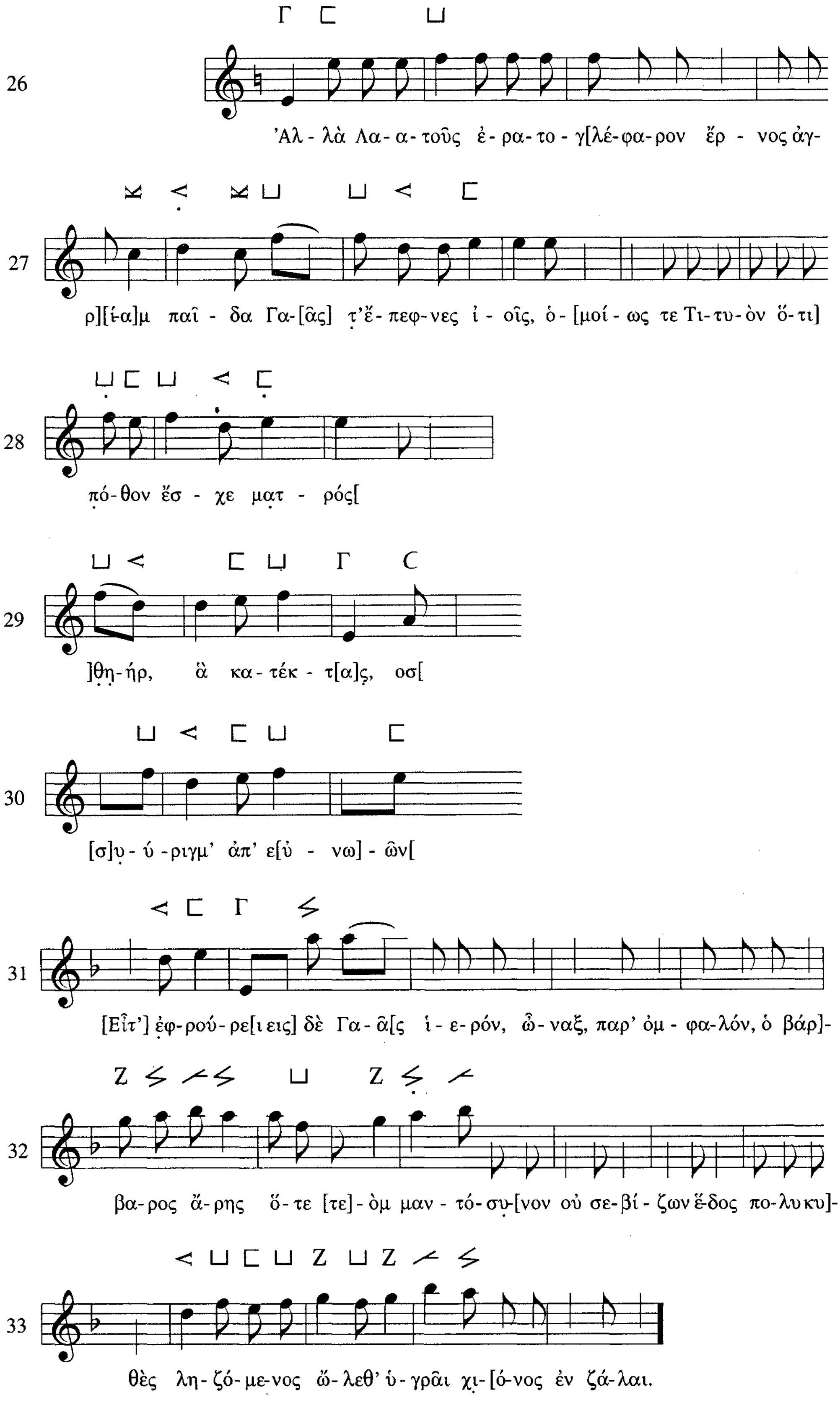
[πα]ι̣ὰν δὲ καὶ π[ροσό]διον εἰς τ[ὸν θεὸν ὃ ἐπό]η̣σε[ν καὶ
π̣ροσεκιθάρισε]ν Λιμ̣ήνι[ος Θ]ο̣ίνο[υ Ἀθηναῖος.]

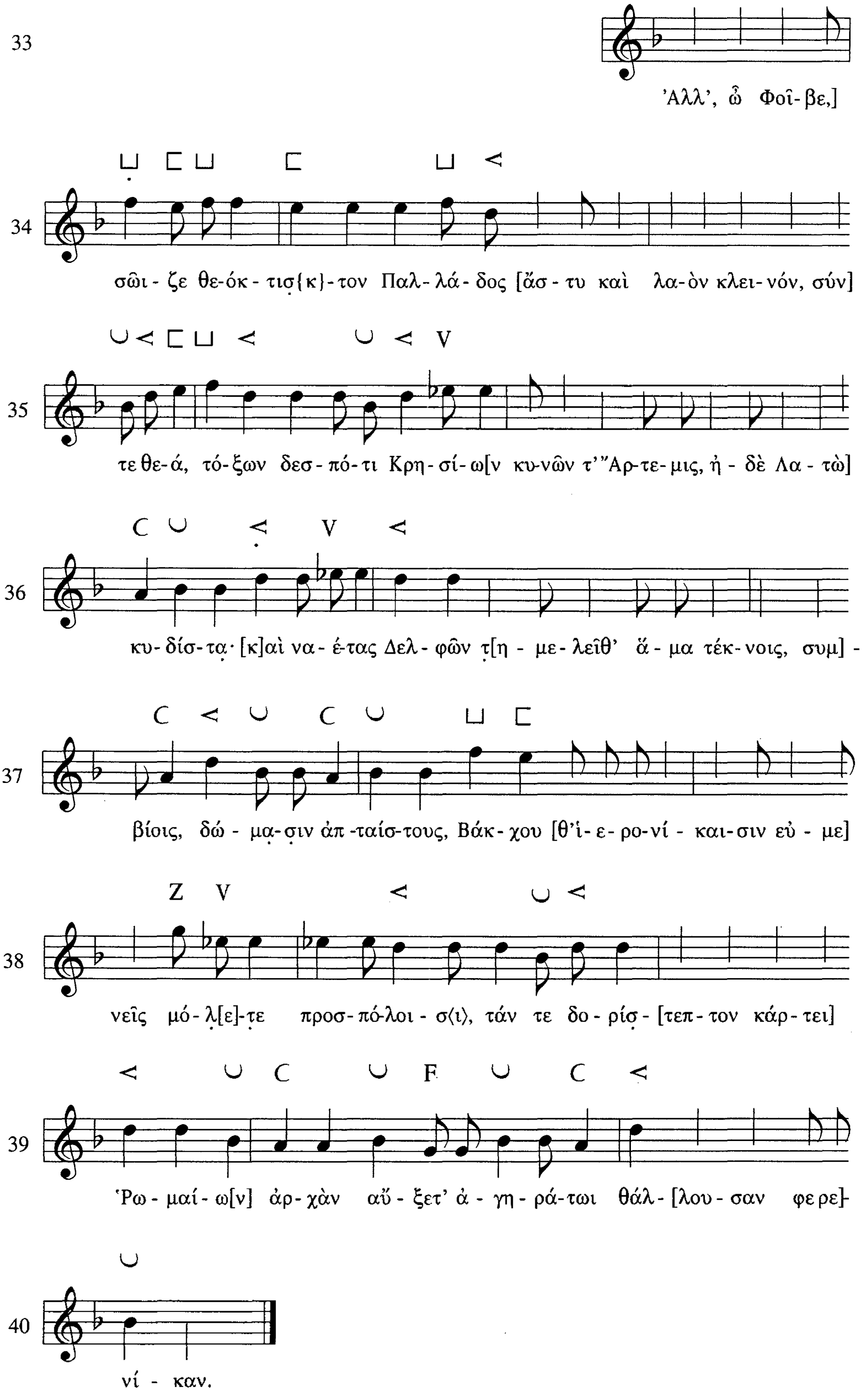

1
[Ἴ]τ' ἐ-πὶ τη - λέ-σκο-πον τα-άν-[δ]ε Πα[ρ - να-σί]-αν [φι-λό-χο-ρον]
2
δι-κό-ρυ-φον κλει-ει-τύν, ὕμ - νω-ων κα̣-[τάρ] - χ̣[ε-τε δ'ἐ-μῶν,]
3
Z V V
Πι - ε-ρί-δες, αἳ νι-φο-βό-λους πέ̣τ-ρας ναί-εθ' [Ἑ-λι]- κω - νί-δ̣[ας·]
4
μέλ - πε-τε δὲ Πύ - θι-ον χ̣[ρ]υ̣-σε-ο-χαί - ταν, ἔ- [κα]-τ̣ον, εὐ - λύ-ραν
5
Φοῖ - βον, ὃν ἔ - τικ-τε Λα̣ - τὼ μά-και - ρα πα-[ρὰ λίμ - ναι] κ̣λυ-ταῖ,
6
Z V V
χερ - σὶ γλαυ - κα-[ᾶ]ς ἐ-λαί - ας θι-γου-οῦσ̣' [ὅ-ζον ἐν ἀ-γω-νί-αι]ς
7
ἐ - ρι-θα - [λῆ.]


8
Π̣[α]-ᾱ̣[ς δὲ γ]ά-θη-σε πό-λος οὐ-ρά-νι-ος̣ [ἀν-νέ-φελος, α-ἀγ]-
9
[λα-ός· ν]η-νέ-μους δ'ἔσ-χεν αἰ-θη-ὴρ ἀ-ε̣[λ-λω-ῶν τα-χυ-πε-τ]εῖς
10
[δρ]ό̣-μους· λῆ-ξε δὲ βα-ρύ-βρο-μον Νη-[η-ρέ-ως ζα-με-νὲς ο]-εῖδμ'
11
ἡ-δὲ μέ-γας Ὠ-κε-α-νός, ὃς πέ-ριξ γ[α-ᾶν ὑ-γραεῖς ἀγ]-κά-
12
λαις α-ἀμ-πέ-χει.
13
Τό-τε λι-πὼγ Κυ-υν-θί-αν να-ᾶ-σον ἐ-π̣[έ-βα Θε-ὸ]ς πρω-[τό]-
14
κα-⟨α⟩ρ-πογ κλυ-τὰν Ἀτ-[θ]ὶδ'ἐ-πὶ γα-α-λ[ό-φωι πρωῶνι]Τρι-τω-ω-νί-δ̣ος·


15
C < Ↄ < V Z V < V
με- λίπ-νο- ον δὲ λί- βυς αὐ - δὰγ χέ- ω[ν λω-ω-τὸς ἀ-νέ-μελ]- πεν [ἁ] -
16
∪ C ⊏ C ∪̣ Ↄ
δει-εῖ- αν ὄ- πα μειγ - νύ-με-νος αι-εἰ - ό-λ[οις κι-θά-ρι- ος μέ- λε-σιν·]
17
∪ < ∪ C ∪ Ↄ ∪ C
[ἄ]-μα δ'ἴ - α-χεμ πετ ρο-κα- τοί - κη-τος ἀ - χ[ὼ παι- ὰν ἰ - ὲ παι- άν·
18a
ὃ] δ̣ε̣ γέ-γαθ'
18
⊔<⊔ < K ⋈ < ⊏ ⊔ ⊏ ⊔ ⋈ K
ὅ-τι νό- ωι δε - ξά- με-νος α- ἀμ-βρό-ταν Δ̣ι - [ὸς ἐ-πέγ- νωφρέ]ν̣' ἀνθ' ωῶν
19
< ⋈ < ⊏ ⊔ < ⊏ ⊔ ⊏̣ ⊏
ἐ-κεί -νας ἀπ' ἀρ - χᾶς Παι- ή - ο - να κι-κλήι-σκ[ο- μεν ἅ-πας λ]α̣- ὸς αὐ̣ - [το]χ-
20
Γ ⋈ ⊏ ⋈ K L C ⋈̣ < ⊏̣
θό νων ἡ - δὲ Βάκ - χου μέ- γας θυρ- σο-πλὴ[ξ ἐσ- μὸς ἱ] - ε- ρὸς τεχ- νι -
21
⊔⊏⊔ <̣ ⊏⊔ ⊏ Γ
τω-ῶν ἔ-νοι - κο-ος πό- λει Κε - κρο - πί - αι.


21
⊏
Ἀλ̣ - [λὰ χρη - η - σμ]ωι - δὸν
22
⊏ < ⊏ ⊔ ⊏ L ⊏ ⊔̣ Γ̣
ὃς ἔ - χει-εις τρί-πο-δα, βαῖν' ἐ-πὶ θε - οσ - τι-β[έ-α τα-άν-δε Π]αρ - να-α̣-
23
N ⊏ ⊔ < ⊏ Γ C < V V <̣
σί-αν δει - ρά - δα φι - λέν-θε-ον. Ἀμ-φὶ πλό - κ[α - μον σὺ δ'οἰ] - νω[ῶπα]
24
Ͻ ◡ C ⊏ C ◡
δάφ - νας κλά-δον πλε - ξά - με-νος α - ἀ - π[λέ-τους θε-με-λί-ους
25
F C ◡ C F Ͻ ◡ C
τ'α-ἀμ-βρό-ται χει - ρί σύ - ρων, ἄ-ναξ, Γ[ᾶς πε-λώ - ρωι συ-ναν - ταῖς]
26
C F
κό - ραι.


26
Ἀλ - λὰ Λα - α - τοῦς ἐ - ρα - το - γ[λέ-φα-ρον ἔρ - νος ἀγ-
27
ρ][ί-α]μ παῖ - δα Γα-[ᾶς] τ'ἔ- πεφ-νες ἰ - οῖς, ὁ- [μοί - ως τε Τι-τυ-ὸν ὅ-τι]
28
πό-θον ἔσ - χε ματ - ρός[
29
]θη-ήρ, ἃ κα-τέκ - τ[α]ς, οσ[
30
[σ]υ- ύ -ριγμ' ἀπ' ε[ὐ - νω] - ῶν[
31
[Εἶτ'] ἐφ-ρού-ρε[ι εις] δὲ Γα- ᾶ[ς ἱ - ε-ρόν, ὦ- ναξ, παρ' ὀμ - φα-λόν, ὁ βάρ]-
32
βα-ρος ἄ-ρης ὅ-τε [τε]- ὀμ μαν - τό-συ-[νον οὐ σε-βί - ζων ἕ-δος πο-λυκυ]-
33
θὲς λη- ζό- με-νος ὤ- λεθ' ὑ - γρᾶι χι-[ό-νος ἐν ζά-λαι.


33
Ἀλλ’, ὦ Φοῖ-βε,]
⊔ ⊏ ⊔ ⊏ ⊔ <
34
σῶι-ζε θε-όκ-τισ̣{κ}-τον Παλ-λά-δος [ἄσ-τυ καὶ λα-ὸν κλει-νόν, σύν]
∪ < ⊏ ⊔ < ∪ < V
35
τε θε-ά, τό-ξων δεσ-πό-τι Κρη-σί-ω[ν κυ-νῶν τ’ Ἄρ-τε-μις, ἡ-δὲ Λα-τὼ]
C ∪ < V <
36
κυ-δίσ-τα̣· [κ]αὶ να-έ-τας Δελ-φῶν τ̣[η-με-λεῖθ’ ἅ-μα τέκ-νοις, συμ]-
C < ∪ C ∪ ⊔ ⊏
37
βίοις, δώ-μα̣-σ̣ιν ἀπ-ταίσ-τους, Βάκ-χου [θ’ ἱ-ε-ρο-νί-και-σιν εὐ-με]
Z V < ∪ <
38
νεῖς μό-λ̣[ε]-τ̣ε προσ-πό-λοι-σ⟨ι⟩, τάν τε δο-ρίσ̣-[τεπ-τον κάρ-τει]
< ∪ C ∪ F ∪ C <
39
Ῥω-μαί-ω[ν] ἀρ-χὰν αὔ-ξετ’ ἀ-γη-ρά-τωι θάλ-[λου-σαν φερε]-
∪
40
νί-καν.

Three large sections of the paean provide an invocation, a narrative of several deeds of Apollo, and a final prayer to Apollo, Artemis, and Leto. In musical terms, these sections are subdivided into several smaller sections (shown by the bracketed paragraph numbers in the translation) that modulate back and forth between Lydian and Hypolydian tonoi. Théodore Reinach observes in his edition of the Delphic paeans[55] that this leads to the following interlocking structure in Limenios's paean:

Lydian:	[1]			[4]			[7]		[9]	[10]
Hypolydian:		[2]	[3]		[5]	[6]		[8]		

The tone of the text is elevated, as would be expected of a paean, and musical allusions abound. In paragraph 4, if the reconstruction of the text is correct, the images employed for the aulos and the kithara in the previous paean are reversed: now it is the kithara that provides the "coiling mele," while the aulos produces a honeyed song with a sweet voice. In common with the first Delphic paean, the Artists of Dionysus appear in paragraph 5. The decree for the Pythian Festival of 128 B.C.E. makes it clear that Limenios's paean was indeed performed by the Artists' choir, which included instrumental and vocal soloists, as well as actors. Elpinikos and Cleon, already encountered as leaders of the boys' choir at the games of 138 B.C.E., are named in the decree, as is a certain Philion.[56]

Paragraph 8 of the paean would certainly have been of a size comparable to the other paragraphs, but this section of stone, which contained the top of the second column of the paean's text and notation, is lost. Enough survives, however, to make clear the subject of the paragraph: the slaying of Tityus by Apollo. A specific reference to the unsuccessful attack on Delphi by the Gauls forms the subject of paragraph 9, and this recalls the very end of the first Delphic paean.[57] Finally, the decline in Athenian autonomy and the increasingly dominant role played by the Romans at Delphi after the defeat of the Achaean League in 146 B.C.E.

---

[55] Reinach, *Les Hymnes delphiques*, 13. He further groups the paragraphs into an eight-part structure: A[1], B[2], C[3–5], D[6], E[7], F[8], G[9], and H[10].

[56] The Festival Decree is No. 47 in the *Fouilles de Delphes* 3, no. 2 (1909–13): 22.

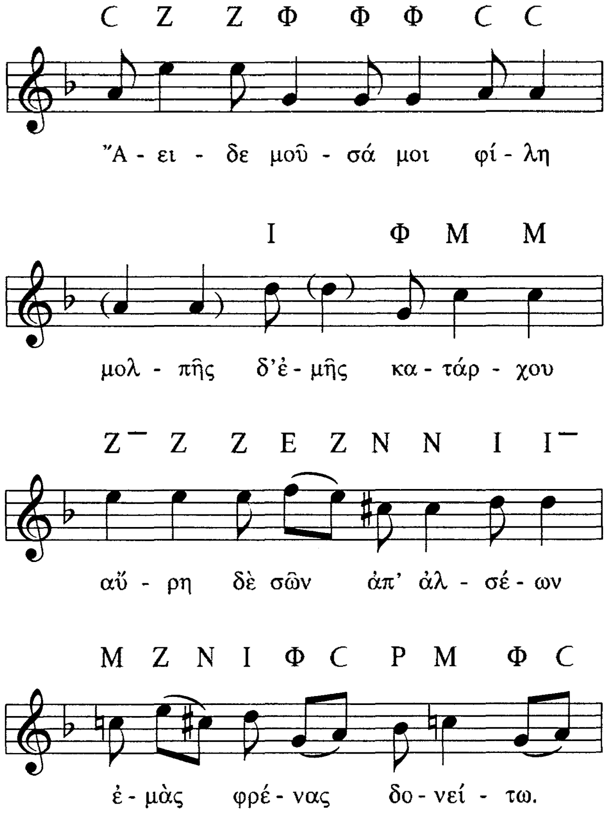
[57] These are probably references to the attack led by Brennus in 279 B.C.E., which was repulsed by the Greeks, aided by a storm. There were, however, other threats from the Gauls in the second century B.C.E.

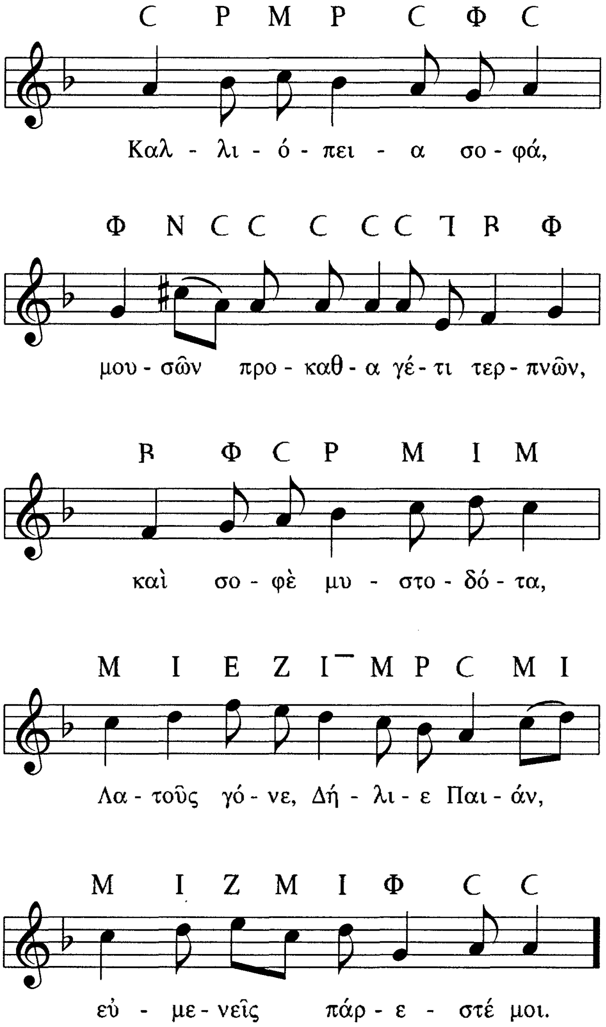
emerges in the closing prayer of paragraph 10, where the Greek gods Apollo, Artemis, and Leto are now appropriated for the protection of the Roman empire.

The virtuosity of the Artists of Dionysus is certainly attested by the musical notation of both paeans. The melodic range is quite wide—nearly an octave and a fifth in Limenios's paean—, the melodies themselves have several extraordinarily large intervals, and there is a fair amount of difficult chromatic movement.

In striking contrast to the complexity and sophistication of the Delphic paeans are the hymns attributed to the Cretan Mesomedes (fl. 141 C.E.) that survive with musical notation in a few manuscripts. The first of these addresses the Muse:

Εἰς Μοῦσαν ἴαμβος


C Z Z Φ Φ Φ C C
Ἄ - ει - δε μοῦ - σά μοι φί - λη
I Φ M M
μολ - πῆς δ'ἐ - μῆς κα - τάρ - χου
Z¯ Z Z E Z N N I I¯
αὔ - ρη δὲ σῶν ἀπ' ἀλ - σέ - ων
M Z N I Φ C P M Φ C
ἐ - μὰς φρέ - νας δο - νεί - τω.


C P M P C Φ C
Καλ - λι - ό - πει - α σο - φά,
Φ N C C C C C Ꞁ Ʀ Φ
μου - σῶν προ - καθ - α γέ - τι τερ - πνῶν,
Ʀ Φ C P M I M
καὶ σο - φὲ μυ - στο - δό - τα,
M I E Z I¯ M P C M I
Λα - τοῦς γό - νε, Δή - λι - ε Παι - άν,
M I Z M I Φ C C
εὐ - με - νεῖς πάρ - ε - στέ μοι.

The hymns of Mesomedes are extremely simple, exhibiting no modulations (all are notated in the Lydian tonos) and very little rhythmic variety or melodic distinction.[58] While the Hymn to Nemesis does convey occasional flashes of melodic character, the Hymn to the Muse with its four lines of straightforward iambic dimeter is typical. The five following lines—now in dactylic hexameter—invoke Calliope and Apollo, but they are given no separate title in the manuscripts. It is unclear whether they should be regarded as a second section of the Hymn to the Muse or as an individual piece. In any case, the text itself, like the music, is simple and direct.

---

[58] Pöhlmann (*Denkmäler,* 13) lists only three codices containing the hymns of Mesomedes with musical notation, but there are actually twelve (Mathiesen, *RISM BXI,* **12** (containing only a fragment of the Hymn to the Muse), **20, 36, 63, 87, 95, 103, 198, 200, 203, 230,** and **273** (the earliest). In addition to these, two codices (**232** and **262**) containing musical treatises exhibit the hymns without musical notation, as does a third (Vaticanus Ottobonianus gr. 59), which has no other material pertinent to ancient Greek music or music theory. On the connection between the treatises of Bacchius and the hymns of Mesomedes, see chapter 6 (pp. 583–85 *infra*).

Hymn to the Muse
Sing, Muse, dear to me,
and prelude my own song.
Let a breeze come forth from your groves,
make my soul tremble.
O wise Calliope who directs the gracious muses,
and you whose wisdom initiates the mysteries,
Son of Latona, Delian Paean,
help me with your favor.[59]

For centuries, the hymn and the paean were forms flexible enough to serve rather diverse literary, devotional, narrative, religious, and civic purposes in Greek society. In the best examples, the musicality of the form is evident not only in the allusions that abound in the texts themselves but also in the way the text and music work together to create rhythmic variety within the larger metric framework and to articulate structural patterns in the overall form. These characteristics will appear in some of the other types, especially the nomos, but the others will have a more narrow range of application in the culture.

Nomos

Of all the musico-poetic forms of ancient Greek music, none is more intriguing than the nomos (νόμος).[60] Descriptions of specific nomoi that appear in a variety of sources, a few of which have already been noted, suggest a style of great complexity, and one that came to be associated with virtuoso performers. It is difficult to make stylistic generalizations of the sort that can be developed for the other types. Nevertheless, four types of nomoi can be identified: two are sung to the accompaniment of a kithara or an aulos, and two are performed by a solo kitharist or aulete.

---

[59] Translation from D. Yeld, in *Musique de la Grèce antique.*

[60] See Heinz Grieser, *Nomos: Ein Beitrag zur griechischen Musikgeschichte,* Quellen und Studien zur Geschichte und Kultur des Altertums und des Mittelalters, vol. 5 (Heidelberg: Prof. F. Bilabel, 1937), for a short monograph on the subject. Also important are Otto Crusius, "Über die Nomosfrage," in *Verhandlungen der 39. Versammlung deutscher Philologen und Schulmänner Zürich 1887* (Leipzig: B. G. Teubner, 1888), 258–76; and Carlo Del Grande, *Espressione musicale dei poetici greci* (Naples: R. Ricciardi, 1932).

The earliest type of nomos is the kitharoedic—a nomos sung to the accompaniment of a kithara. Although nomoi are attributed sometimes to one, sometimes to another composer, Lysias, drawing once again on Heraclides Ponticus, Glaucus of Rhegium, and Alexander, refers in the Plutarchean *De musica* (1132c–1134f) to the famous figure Terpander as the one who first named a number of the kitharoedic nomoi and organized music in Sparta. Nomoi sung to the accompaniment of an aulos—auloedic nomoi—began to be composed somewhat later by Clonas and Ardalus of Troezen. Lysias credits Clonas with the invention of auloedic prosodia, but he is uncertain whether to choose Clonas or Ardalus as the first to compose auloedic nomoi.[61]

Nomoi for solo instruments were a later development, undoubtedly reflecting the rising prominence of a professional class of artists. The Pythic Nomos noted at the beginning of this chapter is an example of the third type, the auletic nomos, an extended composition for solo aulos in which the music itself is highly descriptive or evocative. Auletic nomoi and a fourth type, the kitharistic nomos, were introduced at the Pythian games in 586 and 558 B.C.E. Lysias names Polymnestus, Olympus, Mimnermus, and Sacadas as particularly skilled composer-performers.[62]

---

[61] Terpander (born ca. 710 B.C.E.) flourished in the first third of the seventh century B.C.E. Athenaeus *Deipnosophistae* 14.37 (635e) attests that he won the Carnean musical contests in 676 and 673, and the Plutarchean *De musica* states that he won four successive victories at the Pythian games (1132e [Ziegler 4.23–24]) and was responsible for the organization of music at Sparta (1134b [Ziegler 8.9–11]). Clonas—and perhaps Ardalus—was active in the generation following Terpander (cf. 1132c [Ziegler 4.4–6] and 1133a [Ziegler 5.11–17]). On the kitharoedic nomos, see Carlo Del Grande, "Nomos citarodico," *Rivista Indo-Greca-Italica* 7 (1923): 1–17.

[62] See Pausanias 10.7.4, where it is noted that competitions for singing to the aulos (αὐλῳδία) and solo aulos playing were added in 586 B.C.E. (or perhaps 582 B.C.E., as preferred by current scholarship [cf. N. J. Richardson, "Pythian Games," in *OCD*, 1285]). The Pythian Festival had been held every eight years at Delphi until it was transformed into a Panhellenic festival as part of the Olympiad. Echembrotus won the contest for singing to the aulos, while Sacadas won for solo aulos playing. Sacadas also won victories at the next two festivals (cf. Plutarch *De musica* 1134a [Ziegler 7.23–26]). Sacadas is credited with the

The Aristotelian *Problemata* 19.15 comment on the importance of this imitative style and its association with the professional:

> Why were the nomoi not constructed in antistrophes, while the other choral odes were? Is it because the nomoi were for performers, and as their function was to imitate and exert themselves, the ode became long and diverse? Both the phrases and the mele followed the imitation, always changing. It was more necessary for the melos than for the phrases to imitate.[63]

In at least some cases, instrumental nomoi were based on well-known subjects, such as the contest between Apollo and the Python, and this familiarity certainly assisted listeners in identifying the actions suggested by the music. In concept, therefore, these instrumental nomoi were not unlike much later evocative instrumental forms, such as Johann Kuhnau's *Biblical Sonatas* or the *sinfonia caratteristica* of the eighteenth century. The style, of course, is very different.

Unlike the terms applied to the other musical types, *nomos* is a term in general use that also means "law," "custom," or "convention" in addition to its musical meaning. This complex of meanings enables Plato to develop several musico-political analogies in the *Respublica* and the *Leges*, the most famous of which is his statement at *Leges* 799e: "our songs are our laws."[64] In Book IV, Plato's Athenian Stranger uses the term with both meanings in close proximity when he observes that the lawgiver must artic-

---

composition of the Pythic Nomos in Pollux *Onomasticon* 4.78 (but cf. Strabo *Geographica* 9.3.10). Auloedic nomoi were apparently dropped from the Pythian games beginning with the second festival. Some of the figures named by Lysias are also mentioned by other writers, and some fragments of their poetry survive. Polymnestus, for example, was known to Pindar (see Pindar fr. 188 [ed. Maehler, pt. 2]). On auloedic and auletic nomoi, see Karl von Jan, "Auletischer und auloedischer Nomos," *Jahrbücher für classische Philologie* 119 (1879): 577–92; and idem, "Aulos und Nomos," *Jahrbücher für classische Philologie* 123 (1881): 543–52.

[63] Διὰ τί οἱ μὲν νόμοι οὐκ ἐν ἀντιστρόφοις ἐποιοῦντο, αἱ δὲ ἄλλαι ᾠδαὶ αἱ χορικαί; ἢ ὅτι οἱ μὲν νόμοι ἀγωνιστῶν ἦσαν, ὧν ἤδη μιμεῖσθαι δυναμένων καὶ διατείνεσθαι, ἡ ᾠδὴ ἐγίνετο μακρὰ καὶ πολυειδής; καθάπερ οὖν καὶ τὰ ῥήματα, καὶ τὰ μέλη τῇ μιμήσει ἠκολούθει ἀεὶ ἕτερα γινόμενα. μᾶλλον γὰρ τῷ μέλει ἀνάγκη μιμεῖσθαι ἢ τοῖς ῥήμασιν (*Aristotelis quae feruntur Problemata physica*, edidit Carolus Aemilius Ruelle, recognovit H. Knoellinger, editionem post utriusque mortem curavit praefatione ornavit Josephus Klek [Leipzig: B. G. Teubner, 1922], 918b14–18). The *Problemata* were probably compiled by Aristotle's students after his death in 322 B.C.E.

[64] νόμους τὰς ᾠδὰς ἡμῖν γεγονέναι (799e). See also n. 10 *supra*.

ulate prefatory statements for each statute, just as nomoi are preceded by preludes:

> And indeed, we have admirably elaborated preludes for the so-called nomoi of the kitharoedic ode and every piece of music, but for the real laws [νόμοι], which we say are the political laws, no one has yet uttered a prelude nor composed or brought one to light, as if it did not exist.[65]

The relationship between civic law and the nomos may well be more than a literary device employed by Plato. The Aristotelian *Problemata* propose that the nomoi were so called because the preliterate peoples set their laws to music for mnemonic purposes, while Aristides Quintilianus states that the nomoi were certain mele established by law for use in specific private festivities and public sacred feasts. The Plutarchean Lysias, by contrast, simply asserts that the term was applied to certain pieces because they were based on a particular tuning that had to be maintained throughout. In any case, the term conveys the sense of a piece of music fixed and unalterable.[66]

Proclus's *Chrestomathia* relates the nomos to Apollo through one of his many epithets, in this case, Nomimos:

> The nomos is written for Apollo, from whom it takes its name (for Apollo was called Nomimos). As the ancients were establishing their choruses and singing the nomos accompanied by the aulos or lyre, Chrysothemis the Cretan, using a splendid robe and taking up the kithara in imitation of Apollo, was the first to sing a solo nomos. This was so successful, it has remained the style of the competition. It seems that Terpander, using heroic meter, was the first to perfect the nomos, then Arion of Methymna, who was both poet and kitharode, expanded it quite a bit. Phrynis of Mitylene made innovations in the nomos: he combined the hexameter with a free meter and used more than seven strings. Later, Timotheus gave it its current arrangement.[67]

---

[65] καὶ δή που κιθαρῳδικῆς ᾠδῆς λεγομένων νόμων καὶ πάσης Μούσης προοίμια θαυμαστῶς ἐσπουδασμένα πρόκειται. τῶν δὲ ὄντως νόμων ὄντων, οὓς δὴ πολιτικοὺς εἶναί φαμεν, οὐδεὶς πώποτε οὔτ' εἶπέ τι προοίμιον οὔτε ξυνθέτης γενόμενος ἐξήνεγκεν εἰς τὸ φῶς, ὡς οὐκ ὄντος φύσει (722d–e).

[66] Cf. Aristotle *Problemata* 19.28 (919b38–920a4), Aristides Quintilianus *De musica* 2.6 (W.-I. 59.1–8), and Plutarch *De musica* 1133b–c (Ziegler 6.2–5). For a study of the basic meaning of nomos, see Emmanuel Laroche, *Histoire de la racine nam- en grec ancien*, Collection études et commentaires, vol. 6 (Paris: Klincksieck, 1950).

[67] Ὁ μέντοι νόμος γράφεται μὲν εἰς 'Απόλλωνα, ἔχει δὲ καὶ τὴν ἐπωνυμίαν ἀπ' αὐτοῦ (νόμιμος γὰρ ὁ 'Απόλλων ἐπεκλήθη), ὅτι τῶν ἀρχαίων χοροὺς ἱστάντων καὶ πρὸς αὐλὸν ἢ λύραν ᾀδόντων τὸν νόμον Χρυσόθεμις ὁ Κρὴς πρῶτος, στολῇ χρησάμενος ἐκπρεπεῖ καὶ κιθάραν ἀναλαβὼν εἰς μίμησιν τοῦ 'Απόλλωνος, μόνος ᾖσε νόμον, καὶ εὐδοκιμήσαντος αὐτοῦ διαμένει ὁ τρόπος τοῦ ἀγωνίσματος. Δοκεῖ δὲ Τέρπανδρος μὲν

In this context, Nomimos must mean something like "the Lawgiver," as Apollo is associated with the codes of law in Herodotus's *Historia* 1.65.

Like the other early musico-poetic types, the first generations of kitharoedic nomoi were in dactylic hexameters, though other complementary rhythms were also employed.[68] There may have been some repetition of text ("double phrases"), but the overall style of the diction was calm, grand, and stately. This was enhanced by the stability of the tuning, and Proclus's comments on the style of the nomos suggest a Lydian tuning:

> The nomos, on the other hand [i.e., in contrast to the dithyramb], because of the god [i.e., Apollo], is relaxed in an orderly and magnificent manner and in its rhythms, and it uses double phrases. Moreover, each uses suitable harmoniai. The dithyramb is arranged in the Phrygian and Hypophrygian, while the nomos is arranged in the Lydian scale of the kitharodes. ... the nomos seems to be derived from the paean (the paean is the more general type, written for dismissal of ills, while the nomos is distinctly for Apollo). The nomos is not ecstatic like the dithyramb: the dithyramb is drunkenness and sports, while the nomos is prayers of supplication and great order, for the god himself comprises musical sound in calm order and scale.[69]

πρῶτος τελειῶσαι τὸν νόμον, ἡρῴῳ μέτρῳ χρησάμενος, ἔπειτα Ἀρίων ὁ Μηθυμναῖος οὐκ ὀλίγα συναυξῆσαι, αὐτὸς καὶ ποιητὴς καὶ κιθαρῳδὸς γενόμενος. Φρῦνις δὲ ὁ Μιτυληναῖος ἐκαινοτόμησεν αὐτόν· τό τε γὰρ ἑξάμετρον τῷ λελυμένῳ συνῆψε, καὶ χορδαῖς τῶν ζ' πλείοσιν ἐχρήσατο. Τιμόθεος δὲ ὕστερον εἰς τὴν νῦν αὐτὸν ἤγαγε τάξιν (Bekker 320a33–b11). Cf. *Etymologicon magnum*, s.v. νόμοι κιθαρῳδικοί (607.1–4). Timotheus's controversial addition of extra strings is parodied in the *Cheiron* of Pherecrates, a section of which is quoted by Soterichus in the second part of the Plutarchean *De musica*. See pp. 66–67, 90–92, and 105 *infra*.

[68] See Plutarch *De musica* 1132d–f (Ziegler 4.17–5.8), part of which is Heraclides fr. 157.

[69] Ὁ δὲ νόμος τοὐναντίον διὰ τὸν θεὸν ἀνεῖται τεταγμένως καὶ μεγαλοπρεπῶς καὶ τοῖς ῥυθμοῖς ἀνεῖται καὶ διπλασίοις ταῖς λέξεσι κέχρηται. Οὐ μὴν ἀλλὰ καὶ ταῖς ἁρμονίαις οἰκείαις ἑκάτερος χρῆται· ὁ μὲν γὰρ τὸν φρύγιον καὶ ὑποφρύγιον ἁρμόζεται, ὁ νόμος δὲ τῷ συστήματι τῷ τῶν κιθαρῳδῶν λυδίῳ. ... ὁ δὲ νόμος δοκεῖ μὲν ἀπὸ τοῦ παιᾶνος ῥυῆναι (ὁ μὲν γάρ ἐστι κοινότερος, εἰς κακῶν παραίτησιν γεγραμμένος, ὁ δὲ ἰδίως εἰς Ἀπόλλωνα)· ὅθεν τὸ μὲν ἐνθουσιῶδες οὐκ ἔχει, ὡς ὁ διθύραμβος. Ἐκεῖ μὲν γὰρ μέθαι καὶ παιδιαί, ἐνταῦθα δὲ ἱκετεῖαι καὶ πολλὴ τάξις· καὶ γὰρ αὐτὸς ὁ θεὸς ἐν τάξει καὶ συστήματι κατεσταλμένῳ περιέρχεται τὸν κρουσμόν (Bekker 320b16–30, as emended in Henry, 161). On the various tonoi described in this passage, see chapters 5–6. The reference to "double phrases" could be a comment on the frequent use of compound words in nomoi, rather than on repetition of text (cf. Aristotle *Poetica* 22.10 [1459a8–10]). Numerous examples of compound words appear in the excerpts from Timotheus's *Persae* quoted below.

Nomoi were extended compositions, organized in several sections. Pollux's *Onomasticon* (4.66) names seven parts to the Terpandrean nomos: eparcha, metarcha, katatropa, metakatatropa, omphalos, sphragis, and epilogos.[70] Each of these terms is based on common terminology used in other contexts. Thus, eparcha and metarcha suggest that the nomos begins with a statement of rules, perhaps the basic tuning and rhythm to be employed; the katatropa and metakatatropa suggest a first and second development on this material; the omphalos must be the center-point of the composition; the sphragis is surely the conclusion in which the poet refers to himself and "seals," as it were, the composition; and the epilogos is some sort of coda. This arrangement bears a strong resemblance to the parts of an Indian râga: the âlâpa, which establishes the important points and structure of the scale, as well as the tessitura and types of intervals to be used; the asthai and antara, which are rather like a first and second theme based on the structure established in the âlâpa; the sañcâri, or development; and the âbhog, which functions as a coda.[71] Strabo's *Geographica,* as noted earlier, names five parts in the Pythic Nomos, and although Pollux's description of the same piece differs in some respects, including the name of the composer, it too lists five parts in the composition.[72]

A number of specific kitharoedic and auloedic nomoi are mentioned by Lysias in the Plutarchean *De musica* (1132c–1134f), several of which are confirmed by other writers. Terpander, Lysias states, is supposed to have named certain kitharoedic nomoi Boeotian and Aeolian, Trochaios and Oxys, Cepion and Terpandrean, and Tetraoidios; these are confirmed by Pollux's *Onomasticon* and the *Suda.* Clonas, on the other hand, is credited with the Apothetos and the Schoinia nomoi.[73]

---

[70] μέρη δὲ τοῦ κιθαρῳδικοῦ νόμου, Τερπάνδρου κατανείμαντος, ἔπαρχα, μέταρχα, κατάτροπα, μετακατάτροπα, ὀμφαλός, σφραγίς, ἐπίλογος (*Iulii Pollucis Onomasticon,* ed. Immanuel Bekker [Berlin: Nicolaus, 1846], 158).

[71] See Bake, "The Music of India," 212–15.

[72] Cf. Strabo *Geographica* 9.3.10 and Pollux *Onomasticon* 4.78 and 84.

[73] ἐκεῖνος γοῦν τοὺς κιθαρῳδικοὺς πρότερος ὠνόμασεν Βοιώτιόν τινα καὶ Αἰόλιον Τροχαῖόν τε καὶ Ὀξὺν Κηπίωνά τε καὶ Τερπάνδρειον καλῶν, ἀλλὰ μὴν καὶ Τετραοίδιον (Ziegler 4.14–17). περὶ δὲ Κλονᾶ ὅτι τὸν Ἀπόθετον νόμον καὶ Σχοινίωνα πεποιηκὼς εἴη μνημονεύουσιν οἱ ἀναγεγραφότες (Ziegler 5.19–21) Cf. Pollux *Onomasticon* 4.65, 79 and *Suda,* s.vv. νόμος and ὄρθιος νόμος.

Lysias appears to be more interested in the nomoi for solo instruments. He refers to the famous Polykephalos Nomos, which he is uncertain whether to attribute to Olympus or Crates;[74] the Chariot Nomos, again attributed to Olympus; the Cradias Nomos, attributed to Mimnermus; the Trimere Nomos, attributed perhaps to Sacadas, perhaps to Clonas; and the Orthios Nomos, associated with Polymnestus. The Polykephalos Nomos—or, the Nomos of Many Heads—is also attested by Pindar's twelfth Pythian Ode:

> Lover of splendor, most beautiful of the cities of mortals, home of Persephone, you who live on the nobly built-upon hill above the banks of Acragas where the sheep graze, I ask you, queen, graciously to accept, with the kindliness of immortals and of men, this wreath from Pytho for glorious Midas: and accept him too, who has beaten Greece in the art which Pallas Athena discovered, when she wove together the deathly dirge of the fierce Gorgons, the dirge that she heard poured out in woeful grief from under the maidens' dreadful snaky heads, when Perseus killed one sister out of the three, bringing doom to sea-encircled Seriphos and to its people. ... But when the maiden goddess had saved her dear friend from these toils, she made an every-voiced melos of auloi, to imitate with instruments the clamorous wailing that burst from the ravening jaws of Euryale. The goddess discovered it: but when she had discovered it for mortal men to possess, she named it the Nomos of Many Heads, that glorious suitor for contest to stir the people, coming through thin bronze and through the reeds that grow by the city of the Graces with its lovely dancing-places, in the holy place of the nymph of Cephisus, faithful witness to the dancers.[75]

---

[74] Both of the seventh century B.C.E. On this nomos, see O. Gamba, "Il nomos policefalo," *Dioniso* 6 (1938): 235–52; and Heinrich Guhrauer, "Über νόμος πολυκέφαλος," in *Verhandlungen der 40. Versammlung deutscher Philologen und Schulmänner Görlitz 1889* (Leipzig: B. G. Teubner, 1890), 438–45.

[75] *Pythia* 12.1–12, 18–27:{Α'} Αἰτ⟨έω⟩ σε, φιλάγλαε, καλλίστα βροτεᾶν πολίων, | Φερσεφόνας ἕδος, ἅ τ' ὄχθαις ἔπι μηλοβότου | ναίεις Ἀκράγαντος ἐΰδματον κολώναν, ὦ ἄνα, | ἵλαος ἀθανάτων ἀνδρῶν τε σὺν εὐμενίᾳ | δέξαι στεφάνωμα τόδ' ἐκ Πυθῶνος εὐδόξῳ Μίδᾳ | αὐτόν τε νιν Ἑλλάδα νικάσαντα τέχνᾳ, τάν ποτε | Παλλὰς ἐφεῦρε θρασειᾶν ⟨Γοργόνων⟩ | οὔλιον θρῆνον διαπλέξαισ' Ἀθάνα· | {Β'} τὸν παρθενίοις ὑπό τ' ἀπλάτοις ὀφίων κεφαλαῖς | ἄϊε λειβόμενον δυσπενθέϊ σὺν καμάτῳ, | Περσεὺς ὁπότε τρίτον ἄυσεν κασιγνητᾶν μέρος | ἐνναλίᾳ Σερίφῳ λαοῖσί τε μοῖραν ἄγων. | ... | ... ἀλλ' ἐπεὶ ἐκ τούτων φίλον ἄνδρα πόνων | ἐρρύσατο παρθένος αὐλῶν τεῦχε πάμφωνον μέλος, | ὄφρα τὸν Εὐρυάλας ἐκ καρπαλιμᾶν γενύων | χριμφθέντα σὺν ἔντεσι μιμήσαιτ' ἐρικλάγκταν γόον. | εὗρεν θεός· ἀλλά νιν εὑροῖσ' ἀνδράσι θνατοῖς ἔχειν, | ὠνύμασεν κεφαλᾶν πολλᾶν νόμον, | εὐκλεᾶ λαοσσόων μναστῆρ' ἀγώνων, | {Δ'} λεπτοῦ διανισόμενον χαλκοῦ θαμὰ καὶ δονάκων, | τοὶ παρὰ καλλίχορον ναίοισι πόλιν Χαρίτων | Καφισίδος ἐν τεμένει, πιστοὶ χορευτᾶν μάρτυρες (*Pindari Carmina cum fragmentis*, part 1, 5th ed. by H. Maehler [Leipzig: B. G. Teubner, 1971]). Translation adapted from Barker, *Greek Musical Writings*, 1:57–58; see also his explanatory notes.

The background of the Chariot and Cradias nomoi is obscure, but the titles of the Trimere and Orthios nomoi probably refer to their structure and rhythm. Lysias explains that the Trimere (τριμερῆ) Nomos was so called because Sacadas composed a strophe in each of the three principal tonoi of the time—Dorian, Phrygian, and Lydian—and thus the nomos was organized in three large sections (τριμερῆ).[76] While uniformity of tuning was no doubt a feature of the earlier nomoi, it is apparent that the younger generations of composers departed from a strict observation of this rule. Indeed, the Trimere Nomos brings to mind certain large-scale râgas that shift from one to another; such a râga is called a râgamâla, or "garland of râgas."[77] The orthios rhythm is described by Aristides Quintilianus as a rhythm in the iambic genus, composed "of a tetraseme arsis and an octaseme thesis," i.e., ⏖⏖|⏖⏖⏖⏖; Bacchius (§101) simply states that the orthios is composed of an irrational arsis and a long thesis. In either case, such a rhythm would perfectly suit Proclus's description of the nomos as relaxed, magnificent, and calm.[78]

Of all the figures named as composers of nomoi, Timotheus of Miletus is both the best known and most notorious. The *Suda* credits him with nineteen musical nomoi, thirty-six preludes, eighteen dithyrambs, twenty-one hymns, and other works. Some Greek musicographers considered his works to be rather crude and daring violations of the tradition of the nomos, but his *Persae* nevertheless won the competition at the Athenian games, probably sometime between 420 and 416 B.C.E. Moreover, according to Satyrus's *Vita Euripidis*, the prelude to this nomos was written by another radical stylist, Euripides himself, who championed Timotheus against his opponents.[79]

---

[76] This nomos is generally known as the Trimeles Nomos because the manuscript readings were emended by Xylander, Burette, and others from τριμερῆ to τριμελῆ. Τριμερῆ, however, has been restored in the recent critical text of Ziegler.

[77] See Bake, "The Music of India," 213.

[78] Aristides Quintilianus *De musica* 1.16 (W.-I. 36.3–4); Bacchius (Jan 315.17–18). For the passage from Proclus, see n. 69 *supra*. On the Orthios Nomos in general, see Ernst Graf, "Nomos Orthios," *Rheinisches Museum* 43 (1888): 512–23.

[79] Timotheus lived ca. 450–360 B.C.E.; Euripides, ca. 485–ca. 406 B.C.E. For Satyrus, see G. Arrighetti, ed., *Satiro, Vita di Euripide* (Pisa: Libreria Goliardica Editrice, 1964). All of Timotheus's fragments are conveniently collected and translated in *Lyra Graeca*, vol. 3, rev. ed. by J. M. Edmonds, Loeb Classical

The Plutarchean Lysias observes that Timotheus's earliest nomoi made use of dactylic hexameter—albeit with a mixture of the style of the dithyramb—in order to avoid violating the tradition. Later, however, Timotheus's style became coarse, novel, popular, and commercial.

> But Crexus, Timotheus, Philoxenus, and other poets of that age were more vulgar and loved novelty, pursuing what is now called "humane" and "prize-winning." Thus it transpired that the use of only a few strings and simplicity and solemnity in music are altogether archaic.[80]

Lysias comments on the obsolescence of using "only a few strings" (ὀλιγοχορδία) in the modern style, and Timotheus was indeed known for expanding the musical and emotional range of his compositions by employing a complex melodic style and by actually modifying the construction of the kithara. Soterichus, the second speaker in the Plutarchean *De musica*, states that Timotheus abandoned the traditional seven notes of the lyre, used since the time of Terpander, and he recalls a passage from the *Cheiron* of Pherecrates in which Music, personified as a woman, has suffered various outrages at the hands of modern composers, the worst of which is Timotheus. Justice asks how this came to pass, and Music replies:

> My woes began with Melanippides. He was the first who took and lowered me, making me looser with his dozen strings. Yet after all I found him passable compared with the woes I suffer now. But Cinesias, cursed Athenian, producing exharmonious twists in every strophe has so undone me that in the poesy of his dithyrambs, like reflections in a shield, his dexterity appears to be left-handed. Yet still and all I could put up with him. But Phrynis inserted his own spinning-top, bending and twisting me to total corruption, having twelve harmoniai in his five strings. Yet him too in the end I could

---

Library (Cambridge: Harvard University Press, 1940), 280–333; and *Greek Lyric*, 5 vols., ed. and trans. by David A. Campbell, Loeb Classical Library (Cambridge: Harvard University Press, 1982–1993), 5:70–121.

[80] Κρέξος δὲ καὶ Τιμόθεος καὶ Φιλόξενος καὶ οἱ κατὰ ταύτην τὴν ἡλικίαν γεγονότες ποιηταὶ φορτικώτεροι καὶ φιλόκαινοι γεγόνασι, τὸ φιλάνθρωπον καὶ θεματικὸν νῦν ὀνομαζόμενον διώξαντες· τὴν γὰρ ὀλιγοχορδίαν τε καὶ τὴν ἁπλότητα καὶ σεμνότητα τῆς μουσικῆς παντελῶς ἀρχαϊκὴν εἶναι συμβέβηκεν (1135d [Ziegler 11.5–10]). The translation "prize-winning" (θεματικόν) is based on Pollux *Onomasticon* 3.153 (τοὺς μὲν οὖν καλουμένους ἱεροὺς ἀγῶνας, ὧν τὰ ἆθλα ἐν στεφάνῳ μόνῳ, στεφανίτας ἐκάλεσαν καὶ φυλλίνας, τοὺς δὲ ὠνομασμένους θεματικοὺς ἀργυρίτας [Bekker 143]), where the sacred contests, in which the prize is a crown of leaves, are contrasted with the newer contests, in which prizes of money are awarded.

> accept, for if he slipped he got back on again. But Oh, my dear! Timotheus buried and crushed me most shamefully!
> **Justice**: And who is this Timotheus?
> **Music**: A redhead from Miletus. I say he's caused me more woes than all the others put together, doing those perverted ant-crawlings. And when he finds me on a walk alone, he undoes me and pays me off with his twelve strings.[81]

The precise meaning of each of Pherecrates's numerous plays on words is not certain, but the irony of "left-handed dexterity"; the deprecating epithet of "redhead," which is a slave's name; the general imagery of the rape of Music by modern musicians; and the expansion of the kithara to as many as twelve strings are unmistakable.[82]

Pausanias states that the Spartans objected to Timotheus's addition of four strings to the traditional seven and hung his harp in the meeting house of the Assembly to express their disapproval.[83] These innovations are also the subject of a supposed Spartan decree reproduced by Boethius (480–525/26 C.E.) in Book I of his *De institutione musica.* Boethius, following the lost *musica* of Nicomachus, states that when Timotheus had added a string to those already established and thereby made his music more capricious, the Spartans expelled him.[84] Though the precise number of strings added to the kithara varies from source to source, the point remains the same: Timotheus abandoned the simplicity and grandeur of the ancient style in favor of complexity and virtuosity. Indeed, Timotheus himself boasted of his innovations in a fragment preserved by Athenaeus, perhaps from a sphragis: "I sing not the old songs, for my new songs are better; a young Zeus reigns, and Cronus's rule was long ago; away with the ancient Muse!"[85]

---

[81] ἐμοὶ γὰρ ἦρξε τῶν κακῶν Μελανιππίδης, | ἐν τοῖσι πρῶτος ὃς λαβὼν ἀνῆκέ με | χαλαρωτέραν τ' ἐποίησε χορδαῖς δώδεκα. | ἀλλ' οὖν ὅμως οὗτος μὲν ἦν ἀποχρῶν ἀνὴρ | ἔμοιγε –⏑–⏑ πρὸς τὰ νῦν κακά. | Κινησίας δέ ⟨μ'⟩ ὁ κατάρατος 'Αττικός, | ἐξαρμονίους καμπὰς ποιῶν ἐν ταῖς στροφαῖς | ἀπολώλεχ' οὕτως, ὥστε τῆς ποιήσεως | τῶν διθυράμβων, καθάπερ ἐν ταῖς ἀσπίσιν, | ἀριστέρ' αὐτοῦ φαίνεται τὰ δεξιά. | ἀλλ' οὖν ἀνεκτὸς οὗτος ἦν ὅμως ἐμοί. | Φρῦνις δ' ἴδιον στρόβιλον ἐμβαλών τινα | κάμπτων με καὶ στρέφων ὅλην διέφθορεν, | ἐν πέντε χορδαῖς δώδεχ' ἁρμονίας ἔχων. | ἀλλ' οὖν ἔμοιγε χοὖτος ἦν ἀποχρῶν ἀνήρ· | εἰ γάρ κἀξήμαρτεν, αὖθις ἀνέλαβεν. | ὁ δὲ Τιμόθεός μ' , ὦ φιλτάτη, κατορώρυχε | καὶ διακέκναικ' αἴσχιστα. ⟨ΔΙΚ.⟩ Ποῖος οὑτοσὶ | ⟨ὁ⟩ Τιμόθεος; ⟨ΜΟΥΣ.⟩ Μιλήσιός τις πυρρίας. | κακά μοι παρέσχεν οὗτος, ἅπαντας οὓς λέγω | παρελήλυθεν, ἄγων ἐκτραπέλους μυρμηκιάς. | κἂν ἐντύχῃ πού μοι βαδιζούσῃ μόνῃ, | ἀπέδυσε κἀνέδυσε χορδὰς δώδεκα' (1141d-1142a [Ziegler 25.11–26.9]). Pherecrates won victories at the City Dionysia and the Lenaia between 440 and 430 B.C.E., and all the musicians he mentions in this fragment date from the fifth and fourth centuries. Nineteen titles and 250 fragments of his work are known (see K. J. Dover, "Pherecrates," in *OCD*, 1157).

[82] For a study of some of the terminological problems, see Ingemar Düring, "Studies in Musical Terminology in 5th Century Literature," *Eranos* 43 (1945): 176–97; and for a detailed study of the passage, see Donatella Restani, "Il *Chirone* di Ferecrate e la 'nuova' musica greca," *Rivista italiana di musicologia* 18 (1983): 139–92.

[83] Pausanias 3.12.10. The Nicomachean *Excerpta* (Jan 274.5–6) confirm this number. See also Plutarch *Instituta Laconica* 17 and Athenaeus *Deipnosophistae* 14.39 (636e–f).

A substantial portion of Timotheus's *Persae*—some 253 lines—survives in a nearly contemporary papyrus fragment;[86] it affords a clear view of the literary style and character of the later nomos. This nomos is an account of the battle of Salamis, and as such, it provides ample opportunity for vivid description, word play, and the capacity of the Greek language for stunning onomatopoeia.[87] Two short passages may be taken as typical:

> ... and the sea was shingled o'er with swarming bodies reft of the sunlight by failure of breath, and with the same were the shores heavy laden; while others sat stark and naked on the island-beaches, and with cries and floods of tears, wailing and beating their breasts, were whelmed in mournful

---

[84] A study of this decree appears in Anicius Manlius Severinus Boethius, *Fundamentals of Music*, trans. and ann. by Calvin Bower, Music Theory Translation Series (New Haven, Conn.: Yale University Press, 1989), 4–5 and appendix 2. Ulrich von Wilamowitz-Möllendorff (*Timotheos, Die Perser, aus einem Papyrus von Abusir im Auftrage der Deutschen Orientgesellschaft* [Leipzig: J. C. Hinrichs 1903; reprint (together with *Der Timotheos-papyrus, gefunden bei Abusir am 1. februar 1902*, Wissenschaftliche Veröffentlichungen der Deutschen Orient-Gesellschaft, vol. 3 [Leipzig: J. C. Hinrichs, 1903]), Hildesheim: Olms, 1973], 69–71) considered the text a forgery of the first or second century B.C.E.

[85] Fragment 24 (Edmonds) [Campbell fr. 796] is preserved in Athenaeus *Deipnosophistae* 3.94 (122d): οὐκ ἀείδω τὰ παλαιά, καινὰ γὰρ ἀμὰ κρείσσω. | νέος ὁ Ζεὺς βασιλεύει· | τὸ πάλαι δ' ἦν Κρόνος ἄρχων· | ἀπίτω μοῦσα παλαιά (Kaibel 1:279.23–25 with readings from CE).

[86] *P. Berol.* 9875, fourth century B.C.E. Edition in Wilamowitz-Möllendorff, *Die Perser*.

[87] Or, as W. B. Stanford (*The Sound of Greek: Studies in the Greek Theory and Practice of Euphony*, Sather Classical Lectures, vol. 38 [Berkeley: University of California Press, 1967]) prefers, *mimesis*. See his chapter 5 and the small accompanying recording for an excellent description and demonstration of the Greeks' use of sonic mimickry in their poetry.

> lamentation, and called upon the land of their fathers, saying: "Ho, ye tree-tressèd dells of Mysia, save me out of this place to whence the winds did bring us; else never shall the dust receive my body. ..."[88]

In this passage, the rhythm shifts constantly from line to line, and even within the lines, evoking the anguish, disorder, and tempestuousness of the scene. The language itself changes in sound from the sibilants of the narrative passage, which describes the sea and the shore with seventeen sigmas in ten lines, to the chattering cry of the defeated, which contains thirteen dental mutes—taus, deltas, and thetas—in five lines. In the second passage, Timotheus demeans the Persian enemy by having him speak barbarously in a fractured syntax when he is captured by a Greek soldier:

> ... then writhing and clasping the foeman's knees he would thus inweave the Greek and Asian tongues, marring the clear-cut seal-stamp of his mouth with tracking down the Ionian speech: "I me to thee how? and what to do? me come again nohow; and now brung me here this way my master; no more, father, me no more come this way again to fight, but me not move; me not to you this way, me that way unto Sardy, unto Susa, home Ecbatana. My great God, Artemis, over to Ephesus will protect."[89]

The contrast between Timotheus's style and the style represented by the excerpts of hymns and paeans quoted earlier in this chapter is immediately apparent. There can be little question that Timotheus's reputation for dramatic vividness and daring innovation was fully justified.[90]

---

[88] *Persae,* lines 104–19: κατάστεγος δὲ πόντος ἐκ λιποπνόης | ἁλιοστέρεσιν ἐγάρ|γαιρε σώμασιν, ἐβρίθοντο δ' ἀϊόνες· | οἱ δ' ἐπ' ἀκταῖς ἐνάλοις | ἥμενοι γυμνοπαγεῖς | ἀϋτᾷ τε καὶ δακρυ|σταγεῖ [ῥ]όῳ στερνοκτύποι | βοητᾷ θρηνώδει κατείχοντ' ὀδυρμῷ, | ἅμα δὲ [γᾶν] πατρίαν | ἐπανεκαλέοντ'· "'Ιὼ Μύσιαι | δενδροέθειραι πτυχαί, | [ῥύσ]ασθέ μ' ἔνθεν ὅθεν ἀή|ταις ἐφερόμεθ'· οὐ γὰρ ἔτι ποθ' | ἁμὸν [σῶ]μα δέξεται [κόν]ις ... " (*Lyra Graeca,* 3:316–17).

[89] *Persae,* lines 157–73: ὁ δ' ἀμφὶ γόνασι περιπλεκεὶς | ἔλίσσεθ' Ἑλλάδ' ἐμπλέκων | 'Ασιάδι φωνᾷ, διάτορον | σφραγῖδα θραύων στόματος | 'Ιάονα γλῶσσαν ἐξιχνεύων· | "'Εγώ μοί σοι κῶς καὶ τί πρῆγμα; | αὖτις οὐδαμ' ἔλθω· | καὶ νῦν ἐμὸς δεσπότης | δεῦρο μ' ἐνθάδ' ἦξε, | τὰ λοιπὰ δ' οὐκέτι πάτερ, οὐ|κέτι μάχεσθ' αὖτις ἐνθάδ' ἔρχω. | ἀλλὰ κάθω· | ἐγώ σοι μὴ δεῦρ', ἐγὼ | κεῖσε παρὰ Σάρδι, παρὰ | Σοῦσ', 'Αγβάτανα ναίων. | "Αρτιμις ἐμὸς μέγας θεός | παρ' "Εφεσον φυλάξει" (*Lyra Graeca,* 3:320–21).

[90] It is noteworthy, however, that at least some modern critics have shared the conservative position of Timotheus's contemporary detractors. Mountford and Winnington-Ingram (§10 of "Music," in *OCD,* 2d ed., 711), for example, state: "The rhythms are varied but uninteresting; the diction is turgid, obscure, and undistinguished. But the work is a libretto rather than a poem; and we should not condemn the music unheard, though we may suspect that lack of taste was not

The surviving lines of the papyrus include a section in which the poet claims to have revolutionized music and also recalls his censure by the Spartans. This may be an example of a sphragis and an epilogos:

> But O Great Healer [Ie Paean] to whom we cry, exalter of a new-made Muse of the golden kithara, come thou to aid these hymns of mine. For the great and noble and long-lived guide of Sparta, that people that teems with the blossoms of youth, dings me and drives me with the flare of censure, for that I dishonor the more ancient music with my new hymns. Yet do I keep no man, be he young or old or my own compeer, from these hymns of mine; 'tis the debauchers of the ancient music, them I keep off, the tune torturers who shriek as long, and shrill as loud, as any common crier. In the beginning did Orpheus, son of Calliopè, beget the tortoise-shell lyre of the varied Muses on Mount Pieria; and after him, great Terpander, born of Aeolian Lesbos at Antissa, yoked the Muse in ten songs; and now Timotheus opens the Muse's chambered treasury of many hymns and gives kithara-playing new life with eleven-stroke meters and rhythms, nursling he of Miletus, the town of a twelve-walled people that is chief among the Achaeans.
>
> But to this city I pray thee come, thou far-darting Pythian with the gifts of prosperity and a peace abounding in orderliness for an untroubled people.[91]

As already noted, Euripides wrote the prologue for the *Persae*, and it has generally been supposed that Timotheus influenced Euripides's style. If this is so, and if the surviving musical fragments from Euripides's *Orestes* and *Iphigenia Aulidensis* are accurate representations of the original music for these plays, they may

---

confined to the poetic text[!]" Likewise, Barker (*Greek Musical Writings*, 1:96) states: "The fragments provide adequate evidence of his association of different rhythms, of a strained and artificial diction, and of linguistic fancy embroidering ideas beyond the limits of sense." A more imaginative interpretation of Timotheus's performance appears in Herington, *Poetry into Drama*, 151–60.

[91] *Persae*, lines 215–53: Ἀλλ' ὦ χρυσοκίθαριν ἀέ|ξων μοῦσαν νεοτευχῆ, | ἐμοῖς ἔλθ' ἐπίκουρος ὕ|μνοις, Ἰήϊε Παιάν· | ὁ γάρ μ' εὐγενέτας μακραί|ων Σπάρτας μέγας ἁγεμών, | βρύων ἄνθεσιν ἥβας, | δονεῖ λαὸς ἐπιφλέγων | ἐλᾷ τ' αἴθοπι μώμῳ, | ὅτι παλαιοτέραν νέοις | ὕμνοις μοῦσαν ἀτιμῶ. | ἐγὼ δ' οὔτε νέον τιν' οὔτε | γεραὸν οὔτ' ἰσήβαν | εἴργω τῶνδ' ἑκὰς ὕμνων, | τοὺς δὲ μουσοπαλαιολύ|μας, τούτους δ' ἀπερύκω | λωβητῆρας ἀοιδᾶν | κηρύκων λιγυμακροφων|ων τείνοντας ἰυγάς. | πρῶτος ποικιλόμουσον Ὀρ|φεὺς χέλυν ἐτέκνωσεν, | υἱὸς Καλλιόπας, Πιερίας, ἔπι. | Τέρπανδρος ⟨δ'⟩ ἐπὶ τῷ δέκα | ζεῦξε μοῦσαν ἐν ᾠδαῖς· | Λέσβος δ' Αἰολία ⟨νιν⟩ Ἀν|τίσσᾳ γείνατο κλεινόν· | νῦν δὲ Τιμόθεος μέτροις | ῥυθμοῖς θ' ἑνδεκακρουμάτοις | κίθαριν ἐξανατέλλει, | θησαυρὸν πολυύμνον οἴ|ξας Μουσαᾶν θαλαμευτόν· | Μίλητος δὲ πόλις νιν ἃ | θρέψασ' ἁ δυωδεκατείχεος | λαοῦ πρωτέος ἐξ Ἀχαιῶν. | ἀλλ' ἑκαταβόλε Πύθι' ἁγνὰν | ἔλθοις τάνδε πόλιν σὺν ὄλ|βῳ πέμπων ἀπήμονι λαῷ | τῷδ' εἰρήναν | θάλλουσαν εὐνομίᾳ (*Lyra Graeca*, 3:322–25; translation adapted from Edmonds).

also provide some evidence for Timotheus's musical style.[92] This would have been a style in which the music itself filled out rhythmic patterns not immediately apparent in the text, modulated frequently and in some cases to rather distantly related tonoi, and made use of disjunct leaps and unusual chromatic inflection. It is unfortunate that the musical notation for the *Persae* does not survive.

Dithyramb

While the nomos and the paean are associated with Apollo, at least to some degree, the dithyramb (διθύραμβος) has its origin in the celebration of Dionysus, the god of wine, fertility, and emotional religion. Dithyrambs were large-scale compositions for chorus performed at the festivals in Athens, Delphi, and Delos. In his dialogue on the letter E at Delphi, Plutarch quotes a passage from Aeschylus (fragment 355N) to illustrate the clear association of Dionysus with the dithyramb, which he contrasts to the paean:

> To this god [Dionysus] they also sing dithyrambic mele full of passions and a modulation that has a certain wandering and dissipation. For Aeschylus says: "It is fitting that the dithyramb with its mingled shouts should accompany Dionysus as fellow-reveler." But to the other god [Apollo] they sing the paean, an ordered and temperate muse.[93]

The union of the dithyramb with Dionysus is also apparent in Pindar's thirteenth Olympian Ode and, as noted earlier in this chapter, Book III of Plato's *Leges*.

The Archilochus fragment 77, which contains the earliest appearance of the term "dithyramb," suggests that the composer created dithyrambs while intoxicated with the god: "I know how to lead the fair song of Lord Dionysus, the dithyramb, when my wits are fused with wine."[94] Archilochus was credited by the

---

[92] See pp. 110–24 *infra* for a fuller consideration of this matter. The relationship between Euripides and Timotheus is supported by parallels between the speech of the Persian at *Persae* 152ff and Euripides *Orestes* 1365ff.

[93] καὶ ᾄδουσι τῷ μὲν διθυραμβικὰ μέλη παθῶν μεστὰ καὶ μεταβολῆς πλάνην τινὰ καὶ διαφόρησιν ἐχούσης· "μιξοβόαν," γὰρ Αἰσχύλος φησί, "πρέπει διθύραμβον ὁμαρτεῖν σύγκωμον Διονύσῳ." τῷ δὲ παιᾶνα, τεταγμένην καὶ σώφρονα μοῦσαν (389a–b [text from *Plutarch's Moralia*, 15 vols., Loeb Classical Library (Cambridge: Harvard University Press, 1927–1976), 5:222]).

[94] Archilochus was active in the seventh century B.C.E. The fragment is preserved in Athenaeus *Deipnosophistae* 14.24 (628a–b): ὡς Διωνύσοι' ἄνακτος καλὸν ἐξάρξαι μέλος | οἶδα διθύραμβον, οἴνῳ συγκεραυνωθεὶς φρένας (Kaibel

Plutarchean Soterichus with the invention of a new style of rhythmic composition—the trimeter, the combination of different genera of rhythms, and numerous other innovations.

> Furthermore, Archilochus also discovered the rhythmic composition of trimeters, the setting of non-homogeneous rhythms, the parakataloge, and the accompaniment for these. He is the first to be credited with epodes, tetrameters, the cretic, the prosodiac, and the augmentation of dactylic hexameter (according to some, also the elegiac), and in addition to these, the setting of iambic verse with the paeon epibatos and that of the augmented dactylic hexameter with the prosodiac and the cretic. And with respect to iambic verses, they say that Archilochus demonstrated the practice of speaking some with accompaniment and singing others; afterwards, the tragic poets did this, while Crexus took it over to lead into the dithyramb. They also think that Archilochus was the first to discover accompaniment below the song, while the ancients accompanied everything in unison.[95]

Soterichus's description contains a considerable amount of technical information, at least some of which may apply to the style of the dithyramb. The "trimeters" are probably iambic trimeters, the "tetrameters" trochaic tetrameters. Rhythms, as classed by Aristides Quintilianus and some of the other metricists, are equal (where the arsis and thesis have a ratio of 1:1, as in dactyls and anapests), duple (where the arsis and thesis have a ratio of 2:1, as

---

3:385.24–25). This intoxication should not be understood as simple drunkenness but rather as an infusion of the god that stimulates the composer's creative powers. The sense and importance of intoxication in the cult of Dionysus is made clear in Burkert, *Greek Religion,* 161–63. A very useful overview of the dithyramb appears in Sir Arthur Pickard-Cambridge, *Dithyramb, Tragedy and Comedy,* 2d ed., rev. by T. B. L. Webster (Oxford: Clarendon, 1962), 1–59; for a shorter survey, see G. Aurelio Privitera, "Il ditirambo da canto cultuale a spettacolo musicale," *Cultura e scuola* 43 (1972): 56–66.

[95] ἀλλὰ μὴν καὶ Ἀρχίλοχος τὴν τῶν τριμέτρων ῥυθμοποιίαν προσεξεῦρε καὶ τὴν εἰς τοὺς οὐχ ὁμογενεῖς ῥυθμοὺς ἔντασιν καὶ τὴν παρακαταλογὴν καὶ τὴν περὶ ταῦτα κροῦσιν· πρώτῳ δ᾽ αὐτῷ τά τ᾽ ἐπῳδὰ καὶ τὰ τετράμετρα καὶ τὸ [προ]κρητικὸν καὶ τὸ προσοδιακὸν ἀποδέδοται καὶ ἡ τοῦ ἡρῴου αὔξησις, ὑπ᾽ ἐνίων δὲ καὶ τὸ ἐλεγεῖον, πρὸς δὲ τούτοις ἥ τε τοῦ ἰαμβείου πρὸς τὸν ἐπιβατὸν παίωνα ἔντασις καὶ ἡ τοῦ ηὐξημένου ἡρῴου εἴς τε τὸ προσοδιακὸν καὶ τὸ κρητικόν· ἔτι δὲ τῶν ἰαμβείων τὸ τὰ μὲν λέγεσθαι παρὰ τὴν κροῦσιν, τὰ δ᾽ ᾄδεσθαι Ἀρχίλοχόν φασι καταδεῖξαι, εἶθ᾽ οὕτω χρήσασθαι τοὺς τραγικοὺς ποιητάς, Κρέξον δὲ λαβόντα εἰς διθύραμβον [χρήσασθαι] ἀγαγεῖν. οἴονται δὲ καὶ τὴν κροῦσιν τὴν ὑπὸ τὴν ᾠδὴν τοῦτον πρῶτον εὑρεῖν, τοὺς δ᾽ ἀρχαίους πάντα πρόσχορδα κρούειν (1140f–1141b [Ziegler 23.18–24.5]). On this passage, and especially the meaning of the term ἔντασις, see Giovanni Comotti, "Il valore del termine ἔντασις in Ps. Plut. *De mus.* 28 a proposito dei ritmi di Archiloco," *Quaderni urbinati di cultura classica* n.s. 14 (1983): 93–101.

in iambs or trochees), or sesquialteran (where the arsis and thesis have a ratio of 3:2, as in paeonic rhythm). Thus, Archilochus's non-homogeneous rhythms are those in which the genera are mixed, such as the dochmiacs and prosodiacs; setting a paeon epibatos in iambic verse would be a specific example of mixing rhythms of the duple and sesquialteran genera.[96] The meaning of *parakataloge* is not entirely clear, but it would seem to refer to the practice of using a vocal tone that combines speaking and singing in order to provide a particularly tragic effect at important points within the composition. Since Soterichus seems to be giving an example of each of Archilochus's discoveries after first enumerating them, the description of Archilochus's practice of speaking some iambic verses and singing others may be an example of parakataloge.[97] Finally, the contrast between Archilochus's new style of accompaniment below the song and that of the ancients is based on the term *proschorda*, which describes the ancients' style. In this passage alone, it would be difficult to determine the precise meaning of the term, but the term also appears in Book VII of Plato's *Leges* 7 (812d), where the Athenian Stranger explicitly contrasts the simplicity of teaching the young pupil a note-for-note accompaniment with the difficulty of learning an accompaniment that provides a complex counterpoint to the melody.[98] From all of this, it appears that the dithyramb, like the nomos, was a highly individualized type of considerable complexity, even in its earliest stages.

---

[96] All these rhythmic forms are described in Aristides Quintilianus *De musica* 1.14–17 (W.-I. 32.11–38.14). See Mathiesen, *AQ on Music*, 95–100 for translation and illustration of each of the forms; Aristides Quintilianus's rhythmic theory is also discussed in chapter 6 (pp. 538–41 *infra*).

[97] Cf. the description in Aristotle *Problemata* 19.6 (918a10–120): "Why is *parakataloge* tragic in the odes? Is it because of the dissimilarity? For in extreme calamity or grief, dissimilarity is pathetic, while similarity is less mournful" (Διὰ τί ἡ παρακαταλογὴ ἐν ταῖς ᾠδαῖς τραγικόν; —Ἢ διὰ τὴν ἀνωμαλίαν· παθητικὸν γὰρ τὸ ἀνωμαλὲς καὶ ἐν μεγέθει τύχης ἢ λύπης. τὸ δὲ ὁμαλὲς ἔλαττον γοῶδες [Jan 80.6–9]). Although the style is very different, the same sort of contrast of speaking and singing is created by Arnold Schoenberg in his *Survivor from Warsaw*, op. 46, where it creates a highly pathetic and dramatic effect.

[98] Τούτων τοίνυν δεῖ χάριν τοῖς φθόγγοις τῆς λύρας προσχρῆσθαι, σαφηνείας ἕνεκα τῶν χορδῶν, τόν τε κιθαριστὴν καὶ τὸν παιδευόμενον, ἀποδιδόντας πρόσχορδα τὰ φθέγματα τοῖς φθέγμασι· τὴν δ' ἑτεροφωνίαν καὶ ποικιλίαν τῆς λύρας, ἄλλα μὲν μέλη τῶν χορδῶν ἱεισῶν, ἄλλα δὲ τοῦ τὴν μελῳδίαν ξυνθέντος ποιητοῦ, καὶ δὴ καὶ πυκνότητα μάνοτητι καὶ τάχος βραδυτῆτι καὶ ὀξύτητα βαρύτητι ξύμφωνον [καὶ ἀντίφωνον] παρεχομένους καὶ τῶν ῥυθμῶν ὡσαύτως παντοδαπὰ ποικίλματα προσαρμόττοντας τοῖσι φθόγγοις τῆς λύρας, ... (812d-e).

If Archilochus remains a shadowy figure, Arion and Lasus of Hermione are better known. Herodotus (*Historia* 1.23) regarded Arion, who lived during the reign of Periander,[99] as a nonpareil kitharode, and in addition to his influence on the kitharoedic nomos, he is credited with the composition and naming of specific dithyrambs at Corinth. He thus appears as the counterpart of Terpander, who was credited with naming a number of kitharoedic nomoi at Sparta. Beyond his association with the dithyramb, the *Suda* considers Arion to be the one who established the practice of the chorus singing a stasimon, a composition performed by the chorus in the orchestra and distinct from their entrance (the parodos) and exit (the exodos) music.[100]

Proclus's *Chrestomathia,* despite offering once again a rather tenuous etymological description of the dithyramb, confirms Arion's role in its development and in the establishment of the chorus:

> The dithyramb is written for Dionysus, from whom it takes its name, either because Dionysus was raised in a cave with two doors, near Nysa, or because he was discovered when Zeus's garments were loosened, or because he seemed to be twice born, once of Semele, and a second time from a thigh. Pindar states that the dithyramb was discovered in Corinth, and Aristotle says that the founder of the ode was Arion, who was the first to lead the circular chorus. ... The dithyramb is tumultuous and appears in a highly ecstatic manner with the choral dance; it is suited to the passions most proper to the god; it is hurried along by its rhythms, and it uses simpler diction. ... The dithyramb seems to have been discovered from the sports of the country and from merriment in drinking.[101]

---

[99] Ca. 627–587 B.C.E.

[100] λέγεται καὶ τραγικοῦ τρόπου εὑρετὴς γενέσθαι, καὶ πρῶτος χορὸν στῆσαι καὶ διθύραμβον ᾆσαι καὶ ὀνομάσαι τὸ ᾀδόμενον ὑπὸ τοῦ χοροῦ, καὶ Σατύρους εἰσενεγκεῖν ἔμμετρα λέγοντας (*Suidae Lexicon,* ed. Immanuel Bekker [Berlin: Reimer, 1854], 171). In this interpretation of the phrase χορὸν στῆσαι, which simply means "to establish the chorus," I am following T. B. L. Webster in Pickard-Cambridge, *Dithyramb, Tragedy and Comedy,* 11–12.

[101] Ὁ δὲ διθύραμβος γράφεται μὲν εἰς Διόνυσον, προσαγορεύεται δὲ ἐξ αὐτοῦ ἤτοι διὰ τὸ κατὰ τὴν Νύσσαν ἐπ’ ἄντρῳ διθύρῳ τραφῆναι τὸν Διόνυσον, ἢ διὰ τὸ λυθέντων τῶν ῥαμμάτων τοῦ Διὸς εὑρεθῆναι αὐτόν, ἢ διότι δὶς δοκεῖ γενέσθαι, ἅπαξ μὲν ἐκ τῆς Σεμέλης, δεύτερον δὲ ἐκ τοῦ μηροῦ. εὑρεθῆναι δὲ τὸν διθύραμβον Πίνδαρος ἐν Κορίνθῳ λέγει· τὸν δὲ ἀρξάμενον τῆς ᾠδῆς Ἀριστοτέλης Ἀρίονά φησιν εἶναι, ὃς πρῶτος τὸν κύκλιον ἤγαγε χορόν. ... ἔστιν οὖν ὁ μὲν διθύραμβος κεκινημένος καὶ πολὺ τὸ ἐνθουσιῶδες μετὰ χορείας ἐμφαίνων, εἰς πάθη κατασκευα-

Proclus's etymologies are based on several combinations and legends: the first is clearly derived from the prefix "two" (δι) and "door" (θύρα), which provides the first three syllables of διθύραμβος; the second is less clear but is perhaps derived from the first syllables of "Zeus" (Δι), "loosened" (λυθ), and "garments" (ραμ), which produce a similar though hardly exact parallel. The third is not based on a combination of the words that appear in the etymology but rather on the two (δι) triumphs (θρίαμβος) of Dionysus's legendary double birth from the union of Zeus and Semele.[102]

Lasus of Hermione might be considered a somewhat earlier counterpart of Timotheus in his use of dithyrambic rhythms and a complex melodic style based on the greater flexibility of the aulos. The Plutarchean Soterichus states that Lasus transformed the music "that had heretofore prevailed" and associates him with Melanippides, Philoxenus, and Timotheus. Soterichus sees this transformation as due, at least in part, to the rising importance of the instrumental virtuoso:

> Furthermore, the auletic art changed from simpler to a more varied music. For in ancient times, up to Melanippides the dithyrambic poet, it happened that the auletes received their pay from the poets, since the poesy evidently took the lead and the auletes were subordinate to their masters. But later, this was corrupted.[103]

ζόμενος τὰ μάλιστα οἰκεῖα τῷ θεῷ· καὶ σεσόβηται μὲν καὶ τοῖς ῥυθμοῖς, καὶ ἁπλουστέραις κέχρηται ταῖς λέξεσιν. ... ἔοικε δὲ ὁ μὲν διθύραμβος ἀπὸ τῆς κατὰ τοὺς ἀγροὺς παιδιᾶς καὶ τῆς ἐν τοῖς πότοις εὐφροσύνης εὑρεθῆναι, ... (Bekker 320a25–33, 320b12–16, 21–23). Proclus's description of the dithyramb is interspersed with his description of the nomos (cf. nn. 67 and 69 *supra*). Cf. *Etymologicon magnum*, s.v. διθύραμβος (274.45–54).

[102] Semele, who was carrying Zeus's child, was killed when she was tricked by Hera into forcing Zeus to reveal himself in his true form. Zeus put the unborn child, Dionysus, into his thigh, from which he was born in due time. The double birth could also be a reference to the legend that Dionysus was actually the reborn Zagreus, son of Zeus and Persephone.

[103] Λᾶσος δ' ὁ Ἑρμιονεὺς εἰς τὴν διθυραμβικὴν ἀγωγὴν μεταστήσας τοὺς ῥυθμούς, καὶ τῇ τῶν αὐλῶν πολυφωνίᾳ κατακολουθήσας, πλείοσί τε φθόγγοις καὶ διερριμμένοις χρησάμενος, εἰς μετάθεσιν τὴν προϋπάρχουσαν ἤγαγε μουσικήν. 30. Ὁμοίως δὲ καὶ Μελανιππίδης ὁ μελοποιὸς ἐπιγενόμενος οὐκ ἐνέμεινε τῇ προϋπαρχούσῃ μουσικῇ, ἀλλ' οὐδὲ Φιλόξενος οὐδὲ Τιμόθεος· οὗτος γάρ, ἑπταφθόγγου τῆς λύρας ὑπαρχούσης ἕως εἰς Τέρπανδρον τὸν Ἀντισσαῖον, διέρριψεν εἰς πλείονας φθόγγους. ἀλλὰ γὰρ καὶ ⟨ἡ⟩ αὐλητικὴ ἀφ' ἁπλουστέρας εἰς ποικιλωτέραν μεταβέβηκε μουσικήν· τὸ γὰρ παλαιόν, ἕως εἰς Μελανιππίδην τὸν τῶν διθυράμβων ποιητήν, συσβεβήκει τοὺς αὐλητὰς παρὰ τῶν ποιητῶν λαμβάνειν τοὺς μισθούς,

Although numerous poetic fragments survive that might be considered dithyrambs on stylistic grounds, the clearest substantial examples from the early fifth century B.C.E. are those by Pindar and Bacchylides. One of these, Pindar's *Heracles or Cerberus*, was later quoted by Dionysius of Halicarnassus as an example of Greek asigmatism, or the practice of avoiding as disagreeable the hissing sound of the sigma.[104] The passage quoted by Dionysius does not, in fact, exhibit asigmatism, but it does refer to this practice. In the *Deipnosophistae* (10.82 [455c]), Athenaeus associates it with Pindar's teacher, Lasus of Hermione. Although not an asigmatic ode, the *Heracles* does provide excellent examples of dramatic language, onomatopoeia, and tone, not unlike those already encountered in the nomos:

> Strophe 1:
> In olden days, the lay of the dithyrambs came in a straight line, and the *san* deceptive to men came from their mouths; but now new portals have been flung open for the sacred circles of the dance. Wise are they that know what manner of festival of Bromius [i.e., Dionysus] the Celestials hold in their halls, hard by the sceptre of Zeus. In the presence of the great and solemn Mother, the whirlings of the timpana begin. There, too, the krotala clatter, and the torch blazes under the glowing pines. There, too, the loud wails of the Naiads, and the frenzies and shouts of joy are aroused, the throng tossing their heads. There, too, are brandished the almighty fire-breathing thunderbolt and the spear of Enyalius, while the valiant aegis of Pallas resounds with the hissings of thousands of snakes.
> Antistrophe 1:
> Meanwhile, the lone huntress Artemis swiftly comes, who has yoked in Bacchic revels a brood of savage lions for Bromius, who is enchanted by the dancing herds of beasts. I, too, have been raised up by the Muse for Hellas—with its beautiful chorus—as a chosen herald of wise words, who am proud that my race and my home are in Thebes, the city of chariots, ...[105]

πρωταγωνιστούσης δηλονότι τῆς ποιήσεως, τῶν δ' αὐλητῶν ὑπηρετούντων τοῖς διδασκάλοις· ὕστερον δὲ καὶ τοῦτο διεφθάρη, ... (1141c–d [Ziegler 24.15–25.4]). Soterichus then proceeds to quote the passage from the *Cheiron* of Pherecrates, noted above. Lasus was probably born ca. 545 B.C.E.; Melanippides lived in the fifth century, and his student Philoxenus lived in the last half of the fifth and the first half of the fourth century, as did Timotheus. On the relative importance of the poet and the aulete, see pp. 92–93, 95–96, and 105–6 *infra*.

[104] Dionysius of Halicarnassus *De compositione verborum* 14 (Roberts 148.1–4).

[105] Dithyrambi 70b1–26: [Κ]Α̣Τ̣Α̣[ΒΑΣΙΣ] ΗΡΑΚΛΕ̣Ο̣Υ̣[Σ] Η ΚΕΡΒΕΡΟΣ ΘΗΒΑΙΟΙΣ}

An example of dramatic language appears in strophe 1, where the vivid term ῥιψαύχην—which properly applies to horses tossing their heads—is used to describe the vigorous motions of the crowd. This is especially striking because Proclus also employs equine imagery in the *Chrestomathia* when he mentions in passing the iobacchos (ἰόβακχος), which "was sung at festivals and sacrifices in honor of Dionysus, drowned out by much neighing."[106] Onomatopoeia appears most clearly in lines that refer to specific sounds: "the krotala clatter," with its use of palatal and dental mutes (κέχλαδ[εν] κρόταλ'); or "resounds with the hissings of thousands of snakes," with its use of the doubled gamma and the sibilant zeta and sigma (φθογγάζεται κλαγγαῖς δρακόντων).

Whether or not this particular division of the fragment into strophe and antistrophe is correct, the repetition of rhythmic patterns typical of strophic composition can be seen in a comparison of the first four lines of each section:

Π̣[ρὶν μὲν ἕρπε σχοινοτένειά τ' ἀοιδὰ	—∪—∪—∪∪—∪∪——
δ̣ι̣θ̣ [υράμβων	—∪——
καὶ τὸ σ̣ὰ[ν κίβδηλον ἀνθρώποισιν ἀπὸ στομάτων,	—∪———∪———∪∪—∪∪—
διαπέπ̣[τ]α̣[νται δὲ νῦν ἱροῖς] πύλα[ι κύ-	∪∪———∪———∪——
κλοισι νέαι· [σοφοί οἱ ε]ἰδότες	—∪∪—∪∪———∪—

{A'} Π̣[ρὶν μὲν ἕρπε σχοινοτένειά τ' ἀοιδὰ | δ̣ι̣θ̣ [υράμβων | καὶ τὸ σ̣ὰ[ν κίβδηλον ἀνθρώποισιν ἀπὸ στομάτων, | διαπέπ̣[τ]α̣[νται δὲ νῦν ἱροῖς ?] πύλα[ι κύ|κλοισι νέαι· [σοφοί οἱ ? ε]ἰδότες | οἵαν Βρομίου̣ [τελε]τάν | καὶ παρὰ σκᾶ[πτ]ον Διὸς Οὐρανίδαι | ἐν μεγάροις ἵ[στά]ντι. σεμνᾷ̣ μὲν κατάρχει | Ματέρι πὰρ μ[εγ]άλα̣ ῥόμβοι τυπάνων, | ἐν δὲ κέχλαδ[εν] κρόταλ' αἰθομένα τε | δαῒς ὑπὸ ξαν[θα]ῖ̣σι πεύκαις· | ἐν δὲ Ναΐδων ἐ̣ρίγδουποι στοναχαί | μανίαι τ' ἀλα[αί] τ' ὀρίνεται ῥιψαύχενι | σὺν κλόνῳ̣. | ἐν δ' ὁ παγκρατὴς κεραυνὸς ἀμπνέων | πῦρ κεκίνη̣[ται τό τ'] Ἐ̣νυαλί̣ου | ἔγχος, ἀλκάεσσά [τ]ε̣ Παλλάδο[ς] αἰγίς | μυρίων φθογγάζεται κλαγγαῖς δρακόντων. | ῥίμφα δ' εἶσιν Ἄρτεμις οἰοπολὰς ζεύ|ξαισ' ἐν ὀργαῖς | Βακχίαις φῦλον λεόντων ἀ[γροτέρων Βρομίῳ̣· | ὁ δὲ κηλεῖται χορευοίσαισι κα[ὶ θη|ρῶν ἀγέλαις. ἐμὲ δ' ἐξαίρετο[ν | κάρυκα σοφῶν ἐπέων | Μοῖσ' ἀνέστασ' Ἑλλάδι κα[λ]λ̣[ιχόρῳ̣ | εὐχόμενον βρισαρμάτοις ο̣[ἶκόν Θήβαις, ... (Maehler, pt. 2, with conjectures from Sandys, *Odes of Pindar*, 558–60). Barker, *Greek Musical Writings*, 1:59–60 (as fragment 61) provides a somewhat different translation. The krotala are blocks of wood, hinged with leather, held and clapped together in the hand. They are commonly described as being like castanets, but although they are operated in a similar manner, their sound is lower and resonant, much more like slapsticks than castanets. All the Greeks' instruments will be considered in chapter 3.

[106] ᾖδετο δὲ ὁ Ἰόβακχος ἐν ἑορταῖς καὶ θυσίαις Διονύσου, βεβαπτισμένος πολλῷ φρυάγματι (Bekker 320b31–33).

and

ῥίμφα δ' εἶσιν Ἄρτεμις οἰοπολὰς ζεύ-	–∪–∪–∪∪–∪∪––
ξαισ' ἐν ὀργαῖς	–∪––
Βακχίαις φῦλον λεόντων ἀ[γροτέρων Βρομίῳ·	–∪–––∪–––∪∪–∪∪–
ὁ δὲ κηλεῖται χορευοίσαισι κα[ὶ θη-	∪∪–––∪–––∪––
ρῶν ἀγέλαις. ἐμὲ δ' ἐξαίρετο[ν	–∪∪–∪∪––∪–

In general, the dithyrambs of Pindar would appear to be antistrophic in structure, and like the other musical types, they deal with the deeds of the gods or the heros.[107] Whatever the particular subject, Dionysus is celebrated near the beginning of the composition.

By contrast, the six surviving fragments of dithyrambs by Bacchylides, a contemporary of Pindar, exhibit a more subdued language. Reference to Dionysus is largely absent, as are self-conscious references to musical imagery.[108]

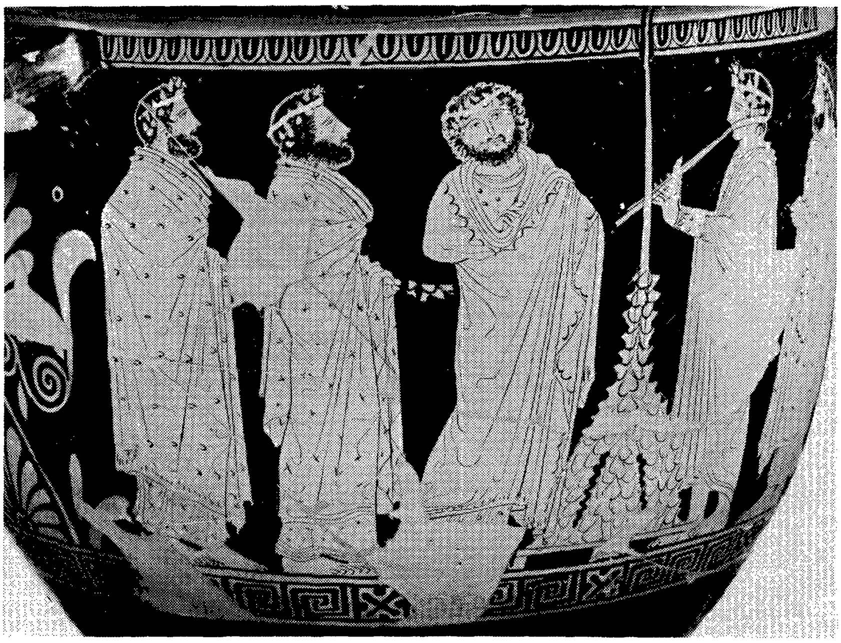
At the Great Dionysia, the dithyramb was performed by a chorus of about fifty men and boys. In addition to the music and the poetry, the tyrbasia (τυρβασία) was danced as part of the dithyramb.[109] An aulete standing in the middle of the dancers accompanied the dithyramb, and on some occasions, the dancers themselves may have worn satyr costumes. Performances of dithyrambs are frequently depicted in vase painting. One bell krater from about 425 B.C.E. (figure 2), for example, shows five bearded singers and an aulos-player, all wearing wreaths of ivy

---

[107] The Plutarchean Soterichus, speaking of Xenocritus, makes this distinction when he says that "it is disputed whether he was a poet of paeans, for they say that he was a poet of heroic themes involving deeds, on which account they call his themes dithyrambs" (ἀμφισβητεῖται εἰ παιάνων ποιητὴς γέγονεν· ἡρωϊκῶν γὰρ ὑποθέσεων πράγματα ἐχουσῶν ποιητὴν γεγονέναι φασὶν αὐτόν· διὸ καί τινας διθυράμβους καλεῖν αὐτοῦ τὰς ὑποθέσεις· [1134e (Ziegler 9.12–15)]). Cf. Plato *Respublica* 3.7 (394c): "and another type of poesy that employs the narration of the poet himself, which would best be discovered in the dithyramb" (ἡ δὲ δι' ἀπαγγελίας αὐτοῦ τοῦ ποιητοῦ· εὕροις δ' ἂν αὐτὴν μάλιστά που ἐν διθυράμβοις·). Pindar's dithyramb fragments are conveniently collected and translated in Sandys, *Odes of Pindar*, 552–61.

[108] The most famous example is perhaps Bacchylides's Ἠΐθεοι ἢ Θησεύς (no. xvi). All the dithyrambs are conveniently collected in *Lyra Graeca*, 3:92–120; and *Greek Lyric*, 4:208–49.

[109] See Lawler, *Dance*, 78–79.



Copenhagen, National Museum, Department of Near Eastern and Classical Antiquities, Inv. 13817

Figure 2.

and decorated chitons and himatia.[110] In earlier times, the aulete was hired by the poet, but later the choregos (χορηγός), a sort of "producer" who represented one of the ten tribes, was responsible for paying the instrumentalist. Dithyrambic poets were assigned to the choregoi by lots, and the auletes were then also assigned to specific choregoi and poets by lot. Because the choregos represented his tribe, it could be a matter of considerable ethnic pride to produce a winning dithyramb, the prize for which was a tripod.[111]

---

[110] Red-figure bell krater, Copenhagen, National Museum, Dept. of Near Eastern and Classical Antiquities, Inv. 13817. Pickard-Cambridge, *Dithyramb, Tragedy and Comedy*, 35, states that the aulete (or, "flute-player" as he has it) too is bearded, but this is not so. The aulete is shown wearing the *phorbeia*, however, and Pickard-Cambridge may have been misled by this. On the performance of dithyrambs at the City Dionysia, see Herington, *Poetry into Drama*, 87–97.

[111] On the authority of Demetrius of Byzantium's *De poematibus* 4, Athenaeus (*Deipnosophistae* 14.33 [633a–b]) states that the choregos was originally the actual leader of the chorus. Later, however, the choregoi were wealthy citizens chosen by the ten tribes (φυλαί) and responsible for the expenses of the production of dithyramb, comedy, and tragedy at the Great Dionysia. This festival, which was instituted or considerably augmented by Peisistratus in 534 B.C.E., was celebrated in Athens in March and began with a procession in which the strategoi (στρατηγοί)—the heads of each of the ten tribes—and the choregoi participated. The festival lasted for five days and included the presentation of five comedies, two dithyrambic competitions, and three sets of tragedies and satyr plays. Dithyrambs were also performed at the Thargelia, Promethia, and

After the fifth century, the innovations already encountered in the nomos became common in the dithyramb as well. Figures such as Timotheus of Miletus and Philoxenus were noted for increasing the complexity of the music through modulations and expansion of the range and number of pitches. Book VIII of Aristotle's *Politica* asserts that the dithyramb made use of the Phrygian tonos, and this was perhaps true of the earlier types. Dionysius of Halicarnassus, however, notes that the dithyrambs of the followers of Timotheus and Philoxenus modulated across several tonoi:

> The composers of dithyrambs shifted the modes [τρόπους], composing with Dorian, Phrygian, and Lydian in their song; and they varied the melodies, composing them now in the enharmonic, next in the chromatic, and next in the diatonic; and they continually showed the greatest independence in rhythms. I am speaking of the followers of Philoxenus, Timotheus, and Telestes, since among the ancients the dithyramb was orderly.[112]

The strict antistrophic structure of the dithyramb was also abandoned in favor of a structure based on anabolai (ἀναβολαί), lyric solos that allowed for greater immediate expression of personal emotion. Aristotle's *Rhetorica* (3.9 [especially 1409b24–32]) associates the use of anabolai in particular with Melanippides, one of the figures pilloried in the *Cheiron* of Pherecrates. While this may be true, the Aristotelian *Problemata* (19.15) observe that the increasingly complex and emotional style of the dithyramb—like that of the nomos—reflected the rising prominence of the virtuoso musician, who demanded the greater flexibility of a nonstrophic structure:

> Why were the nomoi not constructed in antistrophes, while the other choral odes were? Is it because the nomoi were for performers, and as their function was to imitate and exert themselves, the ode became long and diverse? Both the phrases and the mele followed the imitation, always changing. It was more necessary for the melos than for the phrases to imitate. The dithy-

---

Hephaestia. At the Thargelia, for instance, each choregos represented two tribes. See Pickard-Cambridge, *Dithyramb, Tragedy and Comedy*, 35–37; idem, *Dramatic Festivals*, 75–77 and 86–91; and Peter James Wilson, "Choregia," in *OCD*, 323–24.

[112] οἱ δέ γε διθυραμβοποιοὶ καὶ τοὺς τρόπους μετέβαλλον, Δωρίους τε καὶ Φρυγίους καὶ Λυδίους ἐν τῷ αὐτῷ ᾄσματι ποιοῦντες, καὶ τὰς μελῳδίας ἐξήλλαττον, τοτὲ μὲν ἐναρμονίους ποιοῦντες, τοτὲ δὲ χρωματικάς, τοτὲ δὲ διατόνους, καὶ τοῖς ῥυθμοῖς κατὰ πολλὴν ἄδειαν ἐνεξουσιάζοντες διετέλουν, οἵ γε δὴ κατὰ Φιλόξενου καὶ Τιμόθεον καὶ Τελεστήν, ἐπεὶ παρά γε τοῖς ἀρχαίοις τεταγμένος ἦν καὶ ὁ διθύραμβος (Roberts 194.23–196.7). Cf. Aristotle *Politica* 8 (1342b7–12) and *Poetica* 2.4 (1448a14–16) and Pollux *Onomasticon* 4.81. On the melodic genera, see chapters 4–6.

rambs, too, when they became imitative were no longer antistrophic, as they formerly were.[113]

The names of various choregoi, poets, and auletes are recorded on a number of tribal and private choregic monuments. By the second half of the fourth century, the name of the aulete himself sometimes precedes that of the poet and choregos, and this provides further strong indication of the popularity of the virtuoso instrumentalists associated with both the nomos and the dithyramb.[114]

The hymn, paean, nomos, and dithyramb represent the four most important musico-poetic types in Greek culture. As central to the celebration of the gods in various religious and civic festivals, they provided both a means for the cultural heritage to be preserved, interpreted, and communicated, and a mirror of the current social and religious structure of Greek life. This dual role led to the ostensible paradox that has been encountered in the discussion of these four types: each generation regarded the musico-poetic types as sufficiently important to be employed, expanded, and developed, while at the same time viewing innovations and departures from tradition as a matter of suspicion and controversy. But of course, this is not at all paradoxical; rather, it is the clearest expression of the vitality and resiliency of these compositional types, continuing over many centuries.

Prosodion

Inasmuch as several of the musico-poetic types form a part of religious celebration, it is reasonable to suppose that some music would be needed to accompany the movements of the celebrants from one place to another. The prosodion (προσόδιον)—or processional—in fact fills this very function. As part of his definition of the hymn, Proclus states in the *Chrestomathia*:

---

[113] Διὰ τί οἱ μὲν νόμοι οὐκ ἐν ἀντιστρόφοις ἐποιοῦντο, αἱ δὲ ἄλλαι ᾠδαὶ αἱ χορικαί; ἢ ὅτι οἱ μὲν νόμοι ἀγωνιστῶν ἦσαν, ὧν ἤδη μιμεῖσθαι δυναμένων καὶ διατείνεσθαι, ἡ ᾠδὴ ἐγίνετο μακρὰ καὶ πολυειδής; καθάπερ οὖν καὶ τὰ ῥήματα, καὶ τὰ μέλη τῇ μιμήσει ἠκολούθει ἀεὶ ἕτερα γινόμενα. μᾶλλον γὰρ τῷ μέλει ἀνάγκη μιμεῖσθαι ἢ τοῖς ῥήμασιν. διὸ καὶ οἱ διθύραμβοι, ἐπειδὴ μιμητικοὶ ἐγένοντο, οὐκέτι ἔχουσιν ἀντιστρόφους, πρότερον δὲ εἶχον (Ruelle-Knoellinger, 918b14–20).

[114] Pickard-Cambridge, *Dithyramb, Tragedy and Comedy*, 55. Later instrumentalists might even perform classic dithyrambs from the repertory (idem, *Dramatic Festivals*, 79).

> It is said to be a prosodion when they process to the altars or temples, and in processing, it was sung to the accompaniment of the aulos. But the hymn, properly speaking, was sung to the accompaniment of the kithara while they stood.[115]

The inscription preceding the second Delphic paean confirms this association between the prosodion and the hymn or paean, which it may normally have followed. The inscription reads: "Paean and Prosodion to the god, which Limenios, son of Thoinos, Athenian, composed and performed on the kithara." In the Delphic paean, the prosodion occupies lines 33–40 and is structured in eight-syllable cola, each of which could easily be subdivided into four groups of two. The emphasis on long syllables gives this prosodion a stately character.[116] The text of the prosodion, which is comprised in paragraph 10, is devoted to a prayer to Apollo, Artemis, and Leto. This accords with Pollux's *Onomasticon* (1.38), which characterizes a prosodion as a composition particularly devoted to Apollo and Artemis.

Prosodia were among the earliest musical types employed by the Greeks. In three separate locations in his *Graeciae descriptio*, Pausanias remarks on a prosodion composed by Eumelos and sung by a male chorus at the temple of Apollo in Delos during the reign of Phintas. Only two lines of this prosodion survive in Pausanias's quotation:

> For the god of Ithome took pleasure in the Muse, the pure Muse wearing her free sandals.[117]

In the Plutarchean *De musica*, Lysias credits Clonas—the follower of Terpander—as the first to establish auloedic prosodia, while Soterichus observes that prosodia were composed by Alcman,

---

[115] Ἐλέγετο δὲ τὸ προσόδιον ἐπειδὰν προσίωσι τοῖς βωμοῖς ἢ ναοῖς, καὶ ἐν τῷ προσιέναι ᾔδετο πρὸς αὐλόν· ὁ δὲ κυρίως ὕμνος πρὸς κιθάραν ᾔδετο ἑστώτων (Bekker 320a18–20, as emended in Henry, 159–60). The prosodion is contrasted with the hyporcheme in *Etymologicon magnum*, s.v. προσῴδιον (690.41–57). See also προσῳδίαι (690.33–40).

[116] See p. 46.

[117] Pausanias 4.33.2: τῷ γὰρ Ἰθωμάτᾳ καταθύμιος ἔπλετο Μοῖσα | ἁ καθαρὰ καὶ ἐλεύθερα σάμβαλ᾽ ἔχοισα (translation from *Greek Lyric*, 2:291). See also Pausanias 4.4.1; and 5.19.10. The time must have been ca. 740–720 B.C.E. The god of Ithome is Zeus. The second line of this fragment was emended by Bergk (see Jones, 2:352–53) to read ἁ καθαρὰ⟨ν κιθάραν⟩ καὶ ἐλεύθερα σάμβαλ᾽ ἔχοισα, in which case the translation would read: "whose kithara is pure and her sandals free." Such a modification introduces the play on words between καθαρά (pure) and κιθάρα (kithara).

Pindar, Simonides, and Bacchylides.[118] Soterichus states that these prosodia were written in the Dorian tonos because of its grandeur and dignity. This may well be true, although the surviving prosodion in the second Delphic paean is composed in the Lydian tonos.

Only a few poetic fragments can be assigned to the category of prosodia with any certainty, and they are too short to use in drawing any additional conclusions about characteristics of the poetic or musical structure.[119] There are, however, numerous illustrations of processions preserved in Greek vase-painting that confirm the general descriptions in literature. One red-figure krater (Ferrara, Museo Nazionale, T 128) illustrates a prosodion accompanied by an aulete and shows both a statue of one of the gods, which has perhaps been carried in the procession, and the altar itself (see figure 3). The solemnity suggested in this painting suits the prosodion's association with the hymn or the paean. Other paintings of more vigorous movement, often including the figure of Dionysus, probably illustrate one of the dithyrambic dances.

The prosodion as a type may have encompassed relatively short sections following hymns or paeans—and accompanying limited movement from the place where the hymn was sung to the altar itself—as well as longer independent compositions accompanying more extended processions. The prosodion apparently included some narrative about the god to whom it was addressed, but supplication was the central purpose of its text.

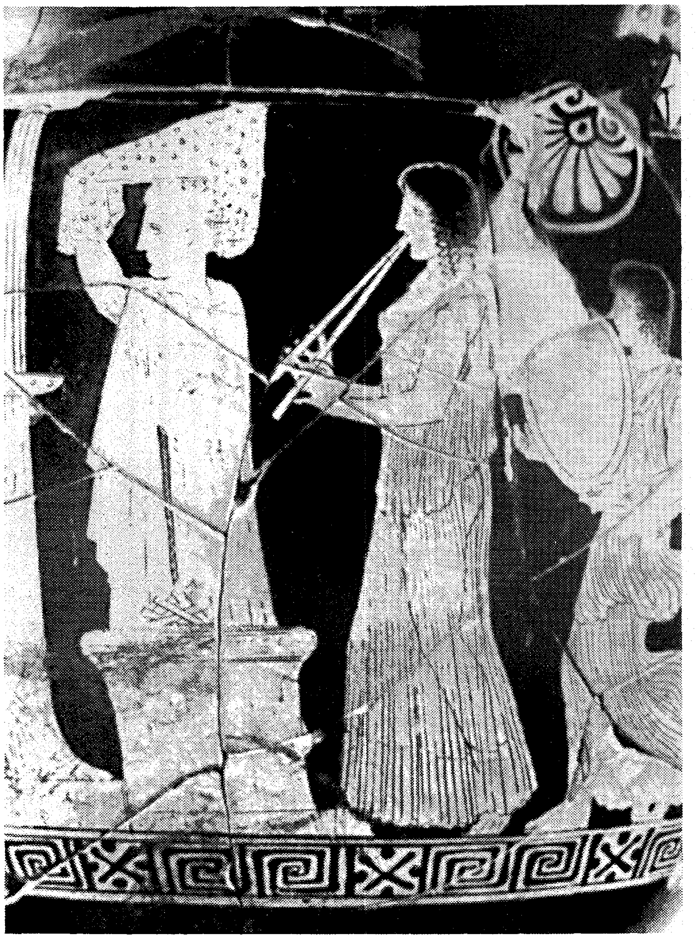
Partheneia

The maiden chorus (παρθένεια) must have existed from the very earliest days of ancient Greek musical culture. Reference is made to a dancing chorus of maidens and young men in the *Iliad* (18.590–606), and the Homeric hymn *In Apollinem* (156–64) refers to a chorus of maidens at Delos, who skillfully sang hymns to Apollo, Leto, and Artemis:

---

[118] Plutarch *De musica* 3 and 17 (1132c and 1136f [Ziegler 4.4–6 and 14.15–17]). These figures range across the seventh (Alcman), sixth, and fifth (Simonides [ca. 556–468/67], Pindar [518–438], and Bacchylides [ca. 520/18–450]) centuries B.C.E.

[119] These would include two fragments by Bacchylides (*Lyra Graeca*, 3:120–22; *Greek Lyric*, 4:262–65) and two by Pindar (Sandys, *Odes of Pindar*, 562–65).



Scala/Art Resource, NY

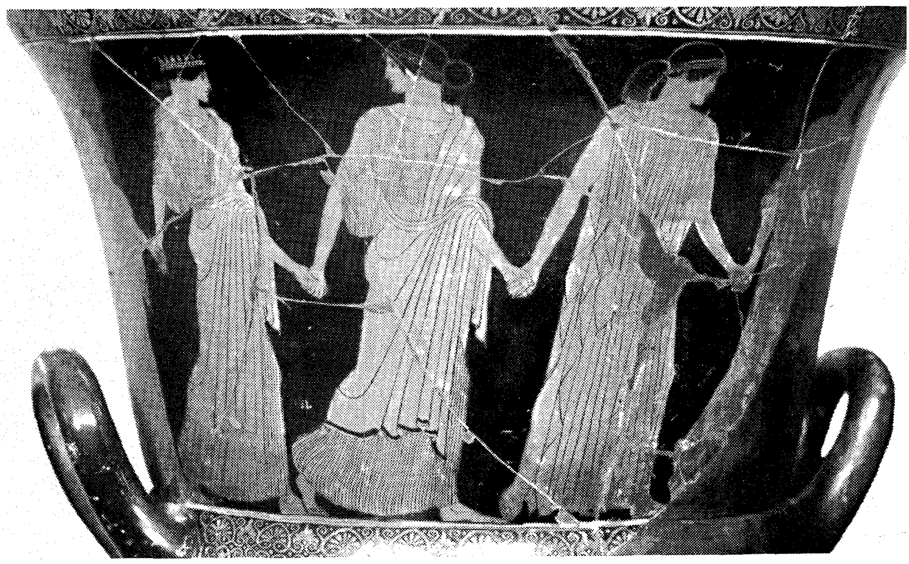
Figure 3.

> And there is this great wonder besides—and its renown shall never perish—, the maidens of Delos, hand-maidens of the Far-shooter; for when they have first hymned Apollo, and also Leto and Artemis who delights in arrows, they sing a hymn telling of men and women of past days, and charm the tribes of men. Also they can imitate the tongues of all men and their chattering speech: each would say that he himself were speaking, so close to the truth is their sweet song.[120]

---

[120] πρὸς δὲ τόδε μέγα θαῦμα, ὅου κλέος οὔποτ' ὀλεῖται, | κοῦραι Δηλιάδες, ἑκατηβελέταο θεράπναι· | αἵ τ' ἐπεὶ ἂρ πρῶτον μὲν 'Απόλλων' ὑμνήσωσιν, | αὖτις δ' αὖ Λητώ τε καὶ ῎Αρτεμιν ἰοχέαιραν, | μνησάμεναι ἀνδρῶν τε παλαιῶν ἠδὲ γυναικῶν | ὕμνον ἀείδουσιν, θέλγουσι δὲ φῦλ' ἀνθρώπων. | πάντων δ' ἀνθρώπων φωνὰς καὶ κρεμβαλιαστὺν | μιμεῖσθ' ἴσασιν· φαίη δέ κεν αὐτὸς ἕκαστος | φθέγγεσθ'· οὕτω σφιν καλὴ συνάρηρεν ἀοιδή (Allen et al. 156–64). Translation adapted from Evelyn-White, *Hesiod*, 335–37. In line 162, an alternative reading, βαμβαλιαστὺν, is offered by several manuscripts, but I prefer κρεμβαλιαστὺν, in the sense of a description the different rhythmic patterns employed by various ethnic groups in their poetry and marked out by the clapping of the krotala (cf. n. 105 *supra*).

Scenes of dancing women appear on numerous vases. Sometimes they are playing the krotala and dancing alone, but in other cases they are shown holding hands and dancing as a chorus (figure 4).



Rome, Museo Nazionale di Villa Giulia
Alinari/Art Resource, NY

Figure 4.

Soterichus, speaking in the Plutarchean *De musica* (1136f), refers specifically to partheneia composed by Alcman, Pindar, Simonides, and Bacchylides, and in fact, an extended excerpt from such a composition by Alcman is preserved in a papyrus of the first century C.E., *P.Louvre* E3320. The surviving part of the Louvre partheneion runs to over one hundred lines, organized in general in fourteen-line strophes; the text is rather fragmented until line 35, after which it is fairly well preserved until line 101. Although the text tends towards a style more intimate and personal than that of the other musical types, this partheneion—like the other musical types—does exhibit a few specific references to its musical nature. The chorus was comprised of ten maidens led by an "illustrious chorus-leader" (ἁ κλεννὰ χοραγός [line 44]), who is given the epithet "Hagesichora" (῾Αγησιχόρα [line 53]). Later, the poet introduces graceful similes to describe Hagesichora's role:

> For (like) the trace-horse ..., and in a ship too one must obey the helmsman most of all; and she [the chorus-leader] is of course (not) more melodious than the Sirens, for they are goddesses; but this our choir of ten sings as well

> as eleven girls: why its song is like that of a swan on the waters of the Xanthus; and she ... her lovely yellow hair ....[121]

Soterichus observes that Alcman wrote Dorian partheneia, and although the context of the passage may lead to the assumption that he is referring to the tonos, he is careful to distinguish between Δώρια Παρθένεια, which is a purely generic usage, and Δωρίου τρόπου or ἐν τῇ Δωριστί, which are specific references to musical modes.

Several fragments survive from the two books of partheneia composed by Pindar. Employing some of the same images encountered in the Homeric hymn and the Alcman fragment, the first antistrophe and epode and the second strophe of fragment 104d add reference to the accompaniment of the aulos and the practice of carrying laurel branches in the dance:

> But quickly girding up my robe, and bearing in my delicate hands a splendid branch of laurel, I shall hymn the all-glorious home of Aeoladas and of his son Pagôndas, with my maidenly head gay with garlands. With the small lotus-wood aulos, I shall imitate in song a siren-sound of praise, such as silences the swift blasts of Zephyr; ...[122]

It would appear from this passage that the partheneia, not unlike the other musico-poetic types, made use of vivid onomatopoeia. In the lines describing the aulos's sound and the Zephyr wind, for example, the poet stresses the long, open vowel omega (αὐλίσκων ὑπὸ λωτίνων) and diphthongs based on alpha (αὐλίσκων, ἀοιδαῖς, and αἰψηράς), as well as the whistling sounds of the sigma and the zeta (Ζεφύρου τε σιγάζει πνοὰς αἰψηράς).

The presence of the laurel branches indicates that fragment 104d must come from the daphnephorika (δαφνηφορικά), a subcategory of the partheneia described by Proclus's *Chrestomathia*:

> The so-called partheneia were written for choruses of maidens. Among these, the daphnephorika fall as a part of this genus. In Boeotia every

---

[121] Lines 92–101: τῶ]ι τε γὰρ σηραφόρωι | αὐ]τῶς εδ[| τ[ῶι] κυβερνάται δὲ χρὴ | κ[ἠ]ν νᾶϊ μάλιστ' ἀκούην· | ἁ δὲ τᾶν Σηρην[ί]δων | ἀοιδοτέρα μ[ὲν οὐχί, | σιαὶ γάρ, ἀντ[ὶ δ' ἕνδεκα | παίδων δεκ[ὰς ἅδ' ἀείδ]ει· | φθέγγεται δ' [ἄρ'] ὥ[τ' ἐπὶ] Ξάνθω ῥοαῖσι | κύκνος· ἁ δ' ἐπιμέρωι ξανθᾶι κομίσκαι | (*Greek Lyric*, 2:368–69). On the Alcman fragment, see also Lawler, *Dance*, 102–4.

[122] Parthenia, fr. 104d.26–36: ἀντ. α' ἀλλὰ ζωσαμένα τε πέπλον ὠκέως, | χερσὶν ἐν μαλακαῖσιν ὅρπακ' ἀγλαὸν | δάφνας ὀχέοισα, παν|δόξον Αἰολάδα σταθμὸν | υἱοῦ τε Παγώνδα | ἐπ. α' ὑμνήσω στεφάνοισι θάλ|λοισα παρθένιον κάρα, | σειρῆνα δὲ κόμπον | αὐλίσκων ὑπὸ λωτίνων | μιμήσομ' ἀοιδαῖς | στρ. β' κεῖνον, ὃς Ζεφύρου τε σιγάζει πνοὰς αἰψηράς, ... (Maehler, pt. 2). Translation adapted from Sandys, *Odes of Pindar*, 569–71.

ninth year when the priests carry laurel into the temples of Apollo, they hymn the god with a chorus of maidens. And this is the reason: those of the Aeolians who inhabited Arne and its regions left there in response to an oracle, and when they were encamped, they went straight to Thebes, which was already occupied by the Pelasgians. As a festival of Apollo, common to both peoples, was begun, they concluded a truce and went to cut laurel to carry to Apollo, one group on the Helicon, the other near the black river. Polematas, the leader of the Boeotians, had a dream that a youth gave him a full suit of armor and ordered that every ninth year prayers be made to Apollo while bearing laurel branches. After the third day, he set upon and vanquished his enemies. He consecrated the daphnephoria, and ever since then, the custom is closely observed. **The daphnephoria**. They wreathe the branch of an olive tree with laurel and various blooms. At the top, a brass sphere is affixed, from which they suspend smaller spheres. At the middle of the branch, they put on a smaller sphere than the one at the top and fasten purple garlands. The bottom of the branch they clothe in saffron-colored fabric. It seems to them that the highest sphere is the sun (with which they associate Apollo); the underlying sphere is the moon; the attachments of the spheres are the stars and the meteors; the garlands are the yearly course (for they make 365 of these). A child with both parents alive leads the daphnephoria; his closest male relative bears aloft the constituted branch, which they call a koppo. The laurel-bearer, following with his flowing hair and wearing a golden crown, holds the laurel in his hands. He is adorned in a radiant garment reaching down to his feet, which are shod in iphikratides. A chorus of maidens follows him closely, holding out branches of olive in supplication and singing a hymn. They conduct the daphnephoria for Apollo Ismenios and Chalazios.[123]

---

[123] Τὰ δὲ λεγόμενα παρθένια χοροῖς παρθένων ἐνεγράφετο. Οἷς καὶ τὰ δαφνηφορικὰ ὡς εἰς γένος πίπτει· δάφνας γὰρ ἐν Βοιωτίᾳ διὰ ἐννεαετηρίδος εἰς τὰ τοῦ Ἀπόλλωνος κομίζοντες ἱερεῖς ἐξύμνουν αὐτὸν διὰ χοροῦ παρθένων. Καὶ ἡ αἰτία· τῶν Αἰολέων ὅσοι κατῴκουν Ἄρνην καὶ τὰ ταύτῃ χωρία κατὰ χρησμὸν ἀναστάντες ἐκεῖθεν καὶ προκαθεζόμενοι Θῆβας ἐπόρθουν προκατεχομένας ὑπὸ Πελασγῶν. Κοινῆς ἀμφοῖν ἑορτῆς Ἀπόλλωνος ἐνστάσης ἀνοχὰς ἔθεντο καὶ δάφνας τέμνοντες οἱ μὲν ἐξ Ἑλικῶνος, οἱ δὲ ἐγγὺς τοῦ Μέλανος ποταμοῦ ἐκόμιζον τῷ Ἀπόλλωνι. Πολεμάτας δέ, ὁ τῶν Βοιωτῶν ἀφηγούμενος, ἔδοξεν ὄναρ νεανίαν τινὰ πανοπλίαν αὐτῷ διδόναι καὶ εὐχὰς ποιεῖσθαι τῷ Ἀπόλλωνι δαφνηφοροῦντας διὰ ἐννεαετηρίδος προστάττειν. Μετὰ δὲ τρίτην ἡμέραν ἐπιθέμενος κρατεῖ τῶν πολεμίων καὶ αὐτός τε τὴν δαφνηφορίαν ἐτέλει· καὶ τὸ ἔθος ἐκεῖθεν διατηρεῖται. Ἡ δὲ δαφνηφορία· ξύλον ἐλαίας καταστέφουσι δάφναις καὶ ποικίλοις ἄνθεσι καὶ ἐπ' ἄκρου μὲν χαλκῆ ἐφαρμόζεται σφαῖρα, ἐκ δὲ ταύτης μικροτέρας ἐξαρτῶσιν· κατὰ δὲ τὸ μέσον τοῦ ξύλου περιθέντες ἐλάσσονα τῆς ἐπ' ἄκρῳ σφαίρας καθάπτουσι πορφυρᾶ στέμματα· τὰ δὲ τελευταῖα τοῦ ξύλου περιστέλλουσι κροκωτῷ. Βούλεται δὲ αὐτοῖς ἡ μὲν ἀνωτάτω σφαῖρα τὸν ἥλιον (ᾧ καὶ τὸν Ἀπόλλωνα ἀναφέρουσιν), ἡ δὲ ὑποκειμένη τὴν σελήνην, τὰ δὲ προσηρτημένα τῶν σφαιρίων ἄστρα τε καὶ ἀστέρας, τὰ δέ γε στέμματα τὸν ἐνιαύσιον δρόμον· καὶ γὰρ καὶ τξε' ποιοῦσιν αὐτά. Ἄρχει δὲ τῆς δαφνηφορίας παῖς ἀμφιθαλής, καὶ ὁ μάλιστα αὐτῷ οἰκεῖος βαστάζει τὸ κατεστεμμένον ξύλον ὃ κώπω καλοῦσιν. Αὐτὸς δὲ ὁ δαφνηφόρος ἑπόμενος τῆς δάφνης ἐφάπτεται, τὰς μὲν κόμας καθειμένος, χρυσοῦν δὲ στέφανον φέρων καὶ

The daphnephorika is not unique as a musico-poetic type associated with the bearing of some object in a procession. The *Chrestomathia* also describes the tripodiphorikon melos, which the Thebans sang while carrying the sacred tripod to Dodona in commemoration of the oracle, and the oschophorika mele, which are sung in a procession from the temple of Dionysus to the sacred precincts of Athena Sciras by an Athenian chorus as part of the Oschophoria. Theseus was said to have instituted the Oschophoria in celebration of Athena and Dionysus, who appeared to him at the island of Dia after his expedition in Crete. The chorus singing the oschophorika was led by two youths drawn from its ranks, dressed as women, and carrying clusters of ripe grapes, which were called "osche" (ὤσχη).[124] While these are not specifically partheneia, they provide additional examples of the elaborate ceremony—frequently involving maidens or young boys—of the special festivals and the important position choral singing occupies in the pageant.

Hyporcheme

Of all the musico-poetic types, the hyporcheme (ὑπόρχημα) is the most difficult to define in stylistic terms, but it is commonly associated with the paean and with a marked rhythmic movement. The first Delphic paean, it will be recalled, was titled "Paean or Hyporcheme,"[125] and the Plutarchean Lysias confirms this ambiguity of type when he mentions the hyporcheme in the course of his survey of music at Sparta:

> Others, like Pratinas, say that Xenodamus was a poet of hyporchemata and not of paeans; and by Xenodamus himself a song is remembered that is apparently a hyporcheme. Pindar, too, used the genus of this poesy. That there is a difference between the paean and the hyporcheme is shown by the poetry of Pindar, for he wrote both paeans and hyporchemata.[126]

λαμπρὰν ἐσθῆτα ποδήρη ἐστολισμένος ἰφικρατίδας τὲ ὑποδεδεμένος· ᾧ χορὸς παρθένων ἐπακολουθεῖ προτείνων κλῶνας πρὸς ἱκετηρίαν ὑμνῶν. Παρέπεμπον δὲ τὴν δαφνηφορίαν εἰς 'Απόλλωνος 'Ισμηνίου καὶ Χαλαζίου (Bekker 321a33–b32).

[124] See Bekker 321b32–322a30.

[125] See pp. 39–44.

[126] ἄλλοι δὲ Ξενόδαμον ὑπορχημάτων ποιητὴν γεγονέναι φασὶ καὶ οὐ παιάνων, καθάπερ Πρατίνας· καὶ αὐτοῦ δὲ τοῦ Ξενοδάμου ἀπομνημονεύεται ᾆσμα ὅ ἐστι φανερῶς ὑπόρχημα. κέχρηται δὲ τῷ γένει τῆς ποιήσεως ταύτης καὶ Πίνδαρος. ὁ δὲ παιὰν ὅτι διαφορὰν ἔχει πρὸς τὰ ὑπορχήματα τὰ Πινδάρου ποιήματα δηλώσει·

Rather substantial fragments of paeans by Pindar do survive and are characteristic of the type. The surviving hyporchemata, on the other hand, are problematic because their classification is a matter of some dispute. In general, the fragments, if they are fragments, are short and epigrammatic or proverbial in character. Fragment 110 (76) is typical:

> To the inexperienced, war is pleasant, but when he has had experience of it, in his heart, he fears exceedingly its approach.[127]

It is possible that the ambiguity may have arisen from attempts to view the hyporcheme in terms of distinctive poetic or musical features rather than in terms of a distinctive type of dance.[128] In Book IX, question 15 of the *Quaestiones convivales*, Plutarch provides a remarkable discussion of dance and the relationship between poetry and dance. He divides dance into three parts: movement (φορά), form (σχῆμα), and pointing (δεῖξις); with these three parts, the dancer is able to achieve a highly detailed imitation of the content of the poem. The dancer engages in movements from one form to another, which Plutarch likens respectively to musical intervals and notes; in the forms, the dancer assumes poses that imitate the shape or outward appearance of the subject; and as necessary, the dancer points to specific persons or objects, such as the sky, the earth, themselves, or bystanders. Dancing and poetry are inextricably associated, he says, and "especially when they are mixed together in the genus of hyporchemata, where they both render a single work, an imitation through forms and words."[129] Plutarch then provides an example drawn from "the writer considered the most successful in hyporchemata":

> Pelasgian horse or Amyclaean hound,
> imitate with the contest foot as you whirl around,
> chasing the twisted melos,

γέγραφε γὰρ καὶ παιᾶνας καὶ ὑπορχήματα (1134c–d [Ziegler 8.20–27]=Heraclides fr. 157).

[127] Hyporchemata fr. 110 (76): γλυκὺ δ' ἀπείρῳ πόλεμος· πεπειραμένων δέ τις ταρβεῖ προσιόντα νιν καρδίᾳ περισσῶς (Maehler, pt. 2). Seven fragments are conveniently collected and translated in Sandys, *Odes of Pindar*, 574–79.

[128] Lawler (*Dance*, 101–2) provides a general description of the dance.

[129] καὶ μάλιστα μιγνύμεναι περὶ τὸ τῶν ὑπορχημάτων γένος ἓν ἔργον ἀμφότεραι τὴν διὰ τῶν σχημάτων καὶ τῶν ὀνομάτων μίμησιν ἀποτελοῦσι (748a–b [text from *Plutarch's Moralia*, 9:294]). Pollux *Onomasticon* 4.103–5 provides a list of imitative forms.

> as along the flowery plain of Dotion he flies,
> seeking to find a way of death
> for the horned deer,
> who turns her head over her shoulder,
> trying every path . . .
>
> and so on. Shall we not say that the poems invite representation in dance and call on our hands and feet, or rather straining our whole body to the mele, as if it were drawn by strings, and when these poems are spoken or sung, the body is incapable of being at rest. He is not ashamed to praise himself as much for his dance as for his poesy when he says:
>
> I know how to mix the feet in a light dance;
> they call it Cretic mode.[130]

The author of the hyporcheme remains unidentified by Plutarch, although it is included as fragment 107 in the Maehler-Snell edition of Pindar.[131] But whoever may be its author, the fragment illustrates a type of text that would indeed lend itself to representational choreography. Moreover, the reference to "twisted melos" (καμπύλον μέλος) recalls the description of "exharmonious twists" (ἐξαρμονίους καμπὰς) in the *Cheiron* of Pherecrates. Thus, it might also be assumed that the music of a hyporcheme would employ a complex and progressive style.

The passing reference to "Cretic mode" here and in some of the early grammarians may lead to the assumption that hyporchemata are written in cretic meter. The shape of this rhythm, however, remains uncertain. Aristides Quintilianus (1.27) associates the paeonic with the cretic meter, but elsewhere (1.17) he defines it as having the rhythmic shape of a trochee thesis and a trochee arsis (–⏑ | –⏑). This would provide a total of six chronoi rather than the five contained in the paeonic rhythm. Other authors, including Hephaestion, define the cretic as –⏑–, which is equivalent to Aristides Quintilianus's amphimacer (1.22).

---

[130] ὁ μάλιστα κατωρθωκέναι δόξας ἐν ὑπορχήμασι ... Πελασγὸν ἵππον ἢ κύνα | Ἀμυκλαίαν ἀγωνίῳ | ἐλελιζόμενος ποδὶ μίμεο καμπύλον μέλος διώκων, | οἷ ἀνὰ Δώτιον ἀνθεμόεν πεδίον | πέτεται θάνατον κεροέσσᾳ | εὑρέμεν ματεύων ἐλάφῳ | τὰν δ' ἐπ' αὐχένι στρέφοισαν κάρα πάντ' ἐπ' οἶμον | καὶ τὰ ἑξῆς μόνον οὐ ... † λειόθεν τὴν ἐν ὀρχήσει διάθεσιν τὰ ποιήματα καὶ παρακαλεῖν τὼ χεῖρε καὶ τὼ πόδε, μᾶλλον δ' ὅλον ὥσπερ τισὶ μηρίνθοις ἕλκειν τὸ σῶμα τοῖς μέλεσι καὶ ἐντείνειν, τούτων λεγομένων καὶ ᾀδομένων ἡσυχίαν ἄγειν μὴ δυνάμενον. αὐτὸς γοῦν ἑαυτὸν οὐκ αἰσχύνεται περὶ τὴν ὄρχησιν οὐχ ἧττον ἢ τὴν ποίησιν ἐγκωμιάζων, ὅταν λέγῃ, ἐλαφρὸν ὄρχημ' οἶδα ποδῶν μειγνύμεν· | Κρῆτα μὲν καλέουσι τρόπον (748b–c [text from *Plutarch's Moralia*, 9:294, 296]).

[131] For the hyporchemata, see Maehler, pt. 2, 95–99.

Hephaestion observes that entire songs (ᾄσματα) are written in cretics and cites a passage by Bacchylides, which consists of five complete cretic feet:

ὦ Περικλειτὲ δᾶλα ἀγνοήσειν μὲν οὔ σ' ἔλπομαι.[132]

On the strength of its metric shape, the fragment has been assigned as a hyporcheme by modern editors,[133] but it is important to note that Hephaestion does not define it as such. In the *Analecta grammatica*, however, the relationship between the hyporcheme and cretic meter is made more explicit:

> This same rhythm [i.e. —∪—] is also called a cretic, as this species of rhythm was contrived by the Cretans, to whom the hyporcheme is also attributed. Hyporchemata are commonly measured by this foot.[134]

This introduction is followed by an example that does indeed feature cretics:

Οὐχ ἕδρας ἔργον οὐδ' ἀμβολᾶς,	——∪—∪——∪—
ἀλλὰ χρυσαίγιδος Ἰτωνίας	—∪——∪∪∪—∪—
χρὴ παρ' εὐδαίδαλον ναὸν ἐλ-	—∪——∪——∪—
θόντας ἁβρόν τι δεῖξαι.[135]	—∪——∪——

The hyporchemata fragments of Pindar, by contrast, do not exhibit this sort of regular cretic meter.

A general definition of hyporcheme as melos accompanied by dance is confirmed by Proclus's *Chrestomathia*. It is unfortunate, however, that in this case the definition is rather brief:

> Melos sung together with dance is called a hyporcheme, for the ancients often take "ὑπό" for "μετά." With respect to the discoverer of these types,

---

[132] Hephaestion *Ench.* 13 (Consbruch 42). Hephaestion fl. second century C.E.

[133] *Lyra Graeca,* 3:124–25 (following the earlier editions of Bergk, Hiller-Crusius, Jebb, and Snell).

[134] ὁ δὲ αὐτὸς καλεῖται καὶ κρητικός, ὡς τῶν Κρητῶν ἐπινοησάντων τὸ εἶδος τοῦ τοιούτου ῥυθμοῦ, οἷς καὶ τὸ ὑπόρχημα ἀναφέρεται· φιλεῖ δὲ τὰ ὑπορχήματα τούτῳ τῷ ποδὶ καταμετρεῖσθαι (Heinrich Keil, *Analecta grammatica,* Programm des Königlichen Pädagogiums in Halle [Halle: Druck der Waisenhaus-Buchdruckerei, 1848], 7.21).

[135] "This is no time for sitting or delay; go we rather to the fair-wrought temple of Itonia of the golden aegis, and there show forth some delicate thing" (*Lyra Graeca,* 3:124–25). The first line of this fragment is also quoted in Athenaeus *Deipnosophistae* 14.30 (Kaibel 3:393.8), where it is attributed to Bacchylides.

> some say it was the Curetes, others, Pyrrhus, the son of Achilles, on which account they also call the species of dance the pyrrhic.[136]

Athenaeus states in the *Deipnosophistae* that the pyrrhic is one of the three types of dance used in lyric poetry, which no doubt makes use of the pyrrhic rhythm (⏑⏑), but as the hyporchematic is another type, the pyrrhic would seem to stand in contrast.[137]

Whatever may be the meter, Athenaeus also confirms (1.27 [15d]) that hyporchemata are representational or mimetic dances and identifies Xenodamus and Pindar as the leading exponents of the style. In the Plutarchean *De musica*, Lysias too identifies Xenodamus as a composer of hyporchemata, attributing the information to Pratinas (fl. early fifth century B.C.E.). Although it does not include any reference to Xenodamus, an interesting fragment by Pratinas is preserved elsewhere in the *Deipnosophistae* (14.8 [617b–f]), where Athenaeus identifies it as a hyporcheme. He also observes that Pratinas wrote the hyporcheme to protest the new style in which the chorus adapted itself to the aulete rather than the aulete to the chorus.

> Pratinas of Phliasios, when hired auletes and choreuts occupied the orchestras, was irritated that the auletes did not play the aulos together with the choruses, as was customary, but rather the choruses had to sing with the auletes. Pratinas displayed the wrath he felt for those who do these things in this hyporcheme.[138]

This change in style has, of course, already been encountered in Soterichus's remarks, and the prominence of the aulete is confirmed as well in the tribal and private choregic monuments.

Pratinas's supposed hyporcheme exhibits some of the same satirical style already encountered in the *Cheiron* of Pherecrates. Here, however, the poet seems less concerned with the issue of musical complexity than with the rising prominence of the aulos, which is criticized for its sound and, of course, for the typical unattractive smell, dampness, and imprecision of all wind instruments:

---

[136] ὑπόρχημα δὲ τὸ μετ' ὀρχήσεως ᾀδόμενον μέλος ἐλέγετο· καὶ γὰρ οἱ παλαιοὶ τὴν ὑπό ἀντὶ τῆς μετά πολλάκις ἐλάμβανον. εὑρέτας δὲ τούτων λέγουσιν οἱ μὲν Κουρῆτας, οἱ δὲ Πύῤῥον τὸν Ἀχιλλέως· ὅθεν καὶ πυῤῥίχην εἶδός τι ὀρχήσεως λέγουσιν (Bekker 320b33–321a2, as emended in Henry, 162). Athenaeus *Deipnosophistae* 14.30 (631c) offers a comparable definition.

[137] Athenaeus *Deipnosophistae* 14.28 (630d). The third type is gymnopaidic. The pyrrhic dance was used in Sparta as part of the training for war; see Plato *Leges* 7 (815a-b) and Lucian *De saltatione* 10 and 16.

[138] Πρατίνας δὲ ὁ Φλιάσιος αὐλητῶν καὶ χορευτῶν μισθοφόρων κατεχόντων τὰς ὀρχήστρας ἀγανακτεῖν τινας ἐπὶ τῷ τοὺς αὐλητὰς μὴ συναυλεῖν τοῖς χοροῖς, καθάπερ ἦν πάτριον, ἀλλὰ τοὺς χοροὺς συνᾴδειν τοῖς αὐληταῖς· ὃν οὖν εἶχεν κατὰ τῶν ταῦτα ποιούντων θυμὸν ὁ Πρατίνας ἐμφανίζει διὰ τοῦδε τοῦ Ὑπορχήματος· (Kaibel 3:361.14–20).

> What is this uproar? What are these choral dances? What outrage came to the tumultuous Dionysian altar? Mine, mine is Bromius. It is for me to shout, it is for me to clap, rushing over the mountains with the Naiads, like a swan leading the many-feathered melos. The Pieris established the song as queen; let the aulos dance behind, for it is the servant. It is accustomed to be the leader only for door-to-door carousals and the brawling of drunken young men. Drive away the one that has the breath of the spotted toad, burn the spit-soaked reed, the low-babbling-unmelodious-arhythmic-stepping flatterer, its body formed by a reamer. See, I fling my right hand and foot at you, Thriambodithyrambos, ivy-crowned lord, hear my Dorian dance.[139]

The fragment evokes the character of the dithyramb in its reference to Dionysus ("Thriambodithyrambos"), its use of vivid and onomatopoetic language, and its tone of intoxication. The remarkable compound λαλοβαρυοπαραμελορυθμοβάταν ("low-babbling-unmelodious-arhythmic-stepping") is a particularly good example of the way in which the poet suggests drunken tumult and babble by creating a word that sounds like nonsense with its string of liquids (λ and ρ), labial and dental mutes (β, π, and θ), and open vowels, while at the same time conveying a very precise meaning.[140]

If it is not possible to differentiate precisely the hyporcheme from the dithyramb or the paean, it does seem apparent that the hyporcheme was associated with the progressive styles but differed from them in the extent to which the dance formed a central part of the composition. Where other styles might use movement for purely practical reasons (as, for example, processional movement in the prosodion) or to articulate the metric or large-scale structure of the composition (as in a paean), the hyporcheme featured highly energetic and representational dance in which the text and music functioned as narrative or programmatic support.

---

[139] τίς ὁ θόρυβος ὅδε; τί τάδε τὰ χορεύματα; τίς ὕβρις ἔμολεν ἐπὶ Διονυσιάδα πολυπάταγα θεμέλαν; ἐμὸς ἐμὸς ὁ Βρόμιος· ἐμὲ δεῖ κελαδεῖν, ἐμὲ δεῖ παταγεῖν ἀν' ὄρεα σύμενον μετὰ Ναιάδων οἷά τε κύκνον ἄγοντα ποικιλόπτερον μέλος. τὰν ἀοιδὰν κατέστασε Πιερὶς βασίλειαν· ὁ δ' αὐλὸς ὕστερον χορευέτω, καὶ γάρ ἐσθ' ὑπηρέτας. κώμοις μόνον θυραμάχοις τε πυγμαχίαισι νέων θέλοι παροίνων ἔμμεναι στρατηλάτας. παῖε τὸν φρυνίου ποικίλου πνοὰν ἔχοντα, φλέγε τὸν ὀλοσιαλοκάλαμον, λαλοβαρυοπαραμελορυθμοβάταν θῶπα τρυπάνῳ δέμας πεπλασμένον. ἣν ἰδού· ἅδε σοι δεξιὰ καὶ ποδὸς διαρριφά, θριαμβοδιθύραμβε, κισσόχαιτ' ἄναξ, ἄκουε τὰν ἐμὰν Δώριον χορείαν (Kaibel 3:361.21–362.15, with readings from A).

[140] There has been some debate about the precise classification of this fragment (for a review, see Pickard-Cambridge, *Dithyramb, Tragedy and Comedy,* 20). It seems clear, however, that the same composition might fall into a number of different classifications; thus, a composition performed in one manner and on one occasion as a dithyramb might become a hyporcheme on another occasion if it was performed and danced in a different manner. The same might also be true for the paean and the hyporcheme, the hymn and the prosodion, and so on. The notion of absolute generic purity reflects a modern aesthetic concept.

Music in the Theatre

Music played a central role in the tragedies, comedies, and satyr plays comprising the tradition of Greek theatre, which centered around the performances of the Great Dionysia. This festival, begun or at least augmented by Peisistratus in 534 B.C.E., was celebrated in Athens in March when the image of Dionysus Eleuthereus was placed in the old temple near the theatre of Dionysus on the southern slope of the Acropolis (see map 3, p. 22, and figure 5 *infra*). Just prior to the beginning of the festival, the image was moved to a temple outside Athens near the Academy; to mark the beginning of the festival, the image was returned to the city in a torchlight procession.[141] The festival lasted for five days and included the presentation of five comedies, one on each afternoon; two of them were preceded by the dithyrambic competitions, which were given in the orchestra, and three by tragedies and satyr plays, which began at daybreak.[142]

Although the origin and history of Greek drama are complex matters, some general observations are possible. In the earliest surviving tragedies, the structure is based on a series of speeches or dialogue, articulated by extended choruses. The dialogue is conducted between a single actor and the chorus leader. Thus, it is probable that the tragedy grew out of choral forms, within which a single actor delivered a spoken prologue and other speeches. There is widespread attribution of this development to a certain Thespis around 534 B.C.E.[143] The number of actors was subsequently increased to two by Aeschylus and three by Sophocles, both of whom developed the form in many other ways.[144]

---

[141] This procession should not be confused with the procession described in connection with the dithyramb in which the strategoi and the choregoi participated (see n. 111 *supra*). The torchlight procession commemorated the arrival of the cult of Dionysus in Athens from its center at Eleutherae (northwest of Athens on the border between Attica and Boeotia [see map 1, p. 20]).

[142] For a detailed study of the theatrical tradition of the Dionysia, see Pickard-Cambridge, *Dithyramb, Tragedy and Comedy* and *Dramatic Festivals;* for useful short surveys, see the *Oxford Companion to Classical Literature* (hereafter *OCCL*), 2d ed. by M. C. Howatson (Oxford: Oxford University Press, 1988), s.vv. comedy, Dionysia, theatre, and tragedy; and comparable articles in *OCD*.

In treating the development of the drama, Aristotle's *Poetica* states that dithyrambs and nomoi utilize melos, rhythm, and meter altogether in combination, while tragedy and comedy use them in various combinations. He adds that the tragedy slowly evolved from "the leaders of the dithyramb," the comedy from the phallic songs, but there has been some reluctance to accept this historical assessment as entirely correct.[145]

In any case, it came to be the practice at the Great Dionysia that three composers of tragedy and five of comedy would compete, each of the latter offering only one play at the festival. The selection of the poets for the competition was the responsibility of the archon eponymos (ἄρχων ἐπώνυμος). He decided upon the competitors after listening to samples of their work;[146] appointed the choregoi, whose role was similar to that already described in connection with the dithyramb; and assigned each competitor a chorus for his work. The chorus was at first composed of free citizens, who were exempted from military service, but by the mid-fourth century B.C.E., a professional class of singers had arisen from which the chorus would be chosen. In the earliest dramas, the poet was himself the principal actor and also trained the chorus. Later, the chorus might be trained by a chorodidaskalos (χοροδιδάσκαλος)—also known as a hypodidaskalos (ὑποδιδάσκαλος)—and the actors were hired by the poet or assigned from a group of actors selected and paid by the state. The performances themselves were competitive: prizes were awarded for the best poet and, later, for the best actor. Beginning in 386 B.C.E., earlier tragedies could be revived and produced as part of the festival; the same allowance was made for comedies, beginning in 339 B.C.E.[147]

---

[143] A brief survey of the sources appears in Pickard-Cambridge, *Dithyramb, Tragedy and Comedy,* 69–72. "Thespis" (θέσπις) may be an epithet derived from references to the "inspired" singer or song in *Od.* 1.328, 8.498, and 17.385.

[144] Aristotle *Poetica* 4.13 (1449a15–19). References to the *Poetica* are drawn from S. H. Butcher, *Aristotle's Theory of Poetry and Fine Art, with a Critical Text and Translation of the Poetics,* 4th ed. (London: Macmillan, 1911; reprint, New York: Dover, 1951). The attribution to Thespis is also included, together with mention of Aeschylus and Old Comedy, in Horace *Ars poetica* 276–80. The *Ars poetica* was probably written around 20 B.C.E. (see Horace, *Satires, Epistles and Ars poetica,* ed. and trans. H. Rushton Fairclough, Loeb Classical Library [Cambridge: Harvard University Press, 1929]).

[145] ἡ μὲν ἀπὸ τῶν ἐξαρχόντων τὸν διθύραμβον (4.12 [1449a10–11; Butcher 18]). Aristotle's terminology recalls the Archilochus fr. 77D (see pp. 71–74), which is sometimes seen as an example of the presence of a soloist-leader (ἐξάρχων) in the dithyramb. See also Aristotle *Poetica* 1.10 (1447b24–28) and 4.12 (1449a9–15). The arguments against Aristotle's explanation of the origin of tragedy are summarized in Pickard-Cambridge, *Dithyramb, Tragedy and Comedy,* 92–95 (but see Webster's defense of Aristotle on pp. 95–97).

[146] Plato *Leges* 7 (816d–817e) notes the role of the archon in the regulation of theatre.

The structure of tragedy is described by Aristotle in section 12 of the *Poetica*:

> We have already spoken of the parts of tragedy that must be taken as species; but as to the number of parts into which it is divided, these are the separate parts: prologos, episodion, exodos, and choral melos—and of the latter, there is on the one hand the parodos and on the other the stasimon. These parts are common to all tragedies; individual are the characters on the stage and the kommoi. The prologos is a complete part of the tragedy that precedes the parodos of the chorus; the episodion is a complete part of the tragedy that is between complete choral mele; the exodos is a complete part of the tragedy after which there is no choral melos. Of the choral part, the parodos is the first complete diction of the chorus, the stasimon is the melos of the chorus without anapest or trochee, and the kommos is the common lamentation of the chorus and the characters on the stage.[148]

A few elaborations may be applied to these descriptions, with figure 5 illustrating the general design of a theatre within which these performances were given.

---

[147] Pickard-Cambridge, *Dramatic Festivals*, 76–101. On the gradual change from citizen-musician to professional musician, see Christian Kaden, "Die Stellung der Berufsmusiker in der Gesellschaft des antiken Griechenland," *Beiträge zur Musikwissenschaft* 11 (1969): 47–66.

[148] Μέρη δὲ τραγῳδίας οἷς μὲν ὡς εἴδεσι δεῖ χρῆσθαι πρότερον εἴπομεν, κατὰ δὲ τὸ ποσὸν καὶ εἰς ἃ διαιρεῖται κεχωρισμένα τάδε ἐστίν, πρόλογος ἐπεισόδιον ἔξοδος χορικόν, καὶ τούτου τὸ μὲν πάροδος τὸ δὲ στάσιμον· κοινὰ μὲν ἁπάντων ταῦτα, ἴδια δὲ τὰ ἀπὸ τῆς σκηνῆς καὶ κόμμοι. ἔστιν δὲ πρόλογος μὲν μέρος ὅλον τραγῳδίας τὸ πρὸ χοροῦ παρόδου, ἐπεισόδιον δὲ μέρος ὅλον τραγῳδίας τὸ μεταξὺ ὅλων χορικῶν μελῶν, ἔξοδος δὲ μέρος ὅλον τραγῳδίας μεθ' ὃ οὐκ ἔστι χοροῦ μέλος· χορικοῦ δὲ πάροδος μὲν ἡ πρώτη λέξις ὅλη χοροῦ, στάσιμον δὲ μέλος χοροῦ τὸ ἄνευ ἀναπαίστου καὶ τροχαίου, κόμμος δὲ θρῆνος κοινὸς χοροῦ καὶ ⟨τῶν⟩ ἀπὸ σκηνῆς (12 [1452b14–25; Butcher 42]). This passage is condemned by some editors.

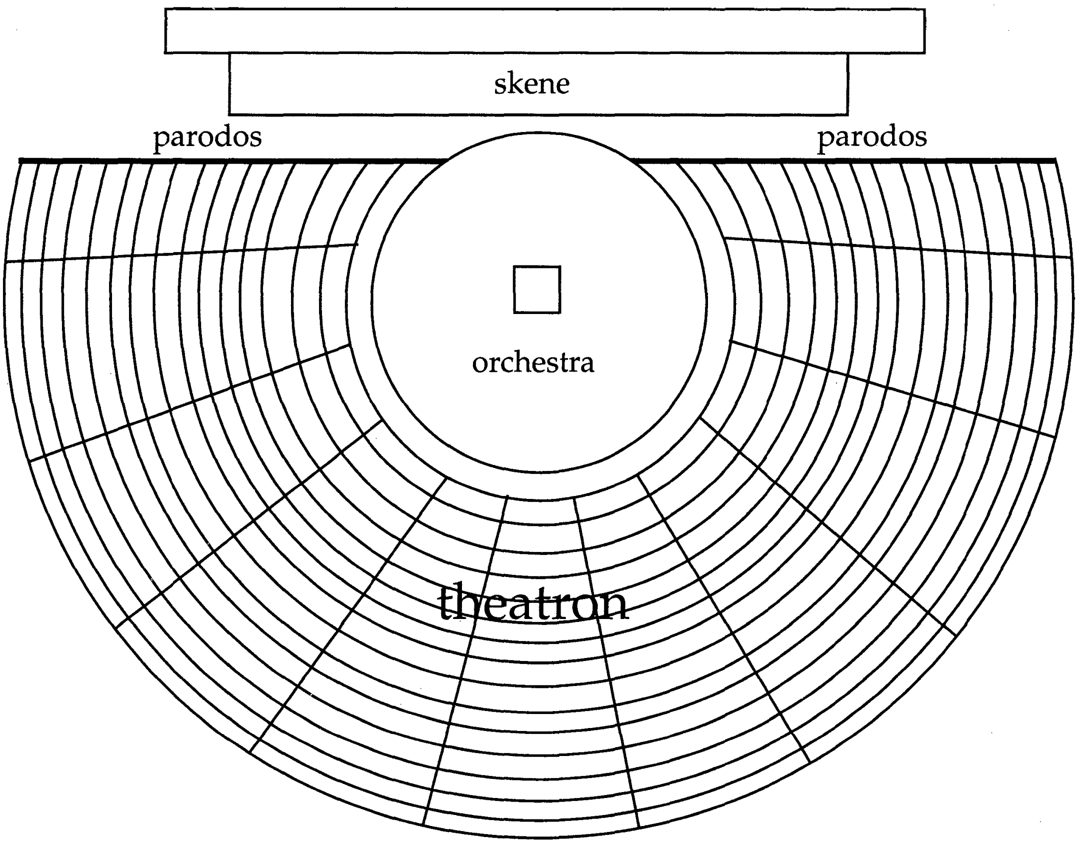


Figure 5.

The prologos is intended to define the subject and the situation of the drama, but the earliest surviving tragedies omit this part. The parodos takes its name from the two pathways—also called parodos—that lead between the seats and the stage to the orchestra. As the chorus sings the parodos, it enters along this pathway.[149] Once in the orchestra, the chorus did not typically leave before the end of the play. The stasimon was sung by the chorus standing in the orchestra; the reference here to the absence of anapest or trochee simply means that the music was not based on the usual "walking" meters.

Most of Aristotle's definitions are more or less repeated in the *Suda* and the *Etymologicon magnum*. Pollux's *Onomasticon* provides similar definitions, an extended description of the theatre itself (4.123–32), and an explanation of the parabasis (παράβασις), a part of comedy in which the leader of the chorus, the koruphaios (κορυφαῖος), addresses the audience directly.

---

[149] See Pollux *Onomasticon* 4.108.

Comedy shared with tragedy the same overall structure, but in the comedy, an opening argument between two of the characters followed the parodos and led to the parabasis (a "digression").[150] Speaking through the koruphaios, the comic poet used the parabasis as a vehicle for expressing his views on public affairs in the most direct manner. According to Pollux, it comprised seven parts: kommation, parabasis, makron, strophe, epirrhema, antistrophe, and antepirrhema. Each of these terms is based on common terminology used in other contexts, but Pollux also defines them. The kommation (short clause) consisted of only two or three verses of melos; the parabasis itself was composed in anapestic meter; the makron (long) is a melodic phrase sung in a single breath, thus seeming long; the strophe is sung in cola prior to the epirrhema (a speech on some matter) being delivered in tetrameters; and when the antistrophe is sung in answer to the strophe, the antepirrhema (a counter-speech), which forms the end of the parabasis, is delivered in at least as many tetrameters as were in the epirrhema. After the parabasis as a whole, a series of episodia and the exodos followed. Hephaestion, by contrast, regards these as seven different types of parabases, the first three in free rhythm, the others in strophic responsion.[151]

Although it is more a series of brief notes than a detailed study, a little treatise περὶ τραγῳδίας (*De tragoedia*) nonetheless confirms many of the earlier definitions, while providing a few additional details.[152] It has been attributed to the eleventh-century Byzantine

---

[150] On the overall structure of the comedy, see Pickard-Cambridge, *Dithyramb, Tragedy and Comedy*, 147–49; his analysis of the structure of the comedies of Aristophanes, showing each of these parts, appears on pp. 213–29.

[151] τῆς μέντοι παραβάσεως τῆς κωμικῆς ἑπτὰ ἂν εἴῃ μέρη, κομμάτιον παράβασις μακρὸν στροφὴ ἐπίρρημα ἀντίστροφος ἀντεπίρρημα, ὧν τὸ μὲν κομμάτιον καταβολή τίς ἐστι βραχέος μέλους, ἡ δὲ παράβασις ὡς τὸ πολὺ μὲν ἐν ἀναπαίστῳ μέτρῳ, εἰ δ᾽ οὖν καὶ ἐν ἄλλῳ, ἀνάπαιστα τὴν ἐπίκλην ἔχει. τὸ δὲ ὀνομαζόμενον μακρὸν ἐπὶ τῇ παραβάσει βραχὺ μελύδριόν ἐστιν, ἀπνευστὶ ᾀδόμενον. τῇ δὲ στροφῇ ἐν κώλοις προᾳσθείσῃ τὸ ἐπίρρημα ἐν τετραμέτροις ἐπάγεται. καὶ τῆς ἀντιστρόφου τῇ στροφῇ ἀντᾳσθείσης, τὸ ἀντεπίρρημα τελευταῖον ὂν τῆς παραβάσεως ἐστὶ τετράμετρα, οὐκ ἐλάττω τὸν ἀριθμὸν τοῦ ἐπιρρήματος (4.112 [Bekker 168–69]). Cf. Hephaestion *Poem.* 8 (Consbruch 72–73).

[152] Especially with respect to the music, which will be considered later in this section. For the text and a brief analysis of its contents, see Robert Browning, "A Byzantine Treatise on Tragedy," in *ΓΕΡΑΣ: Studies Presented to George Thomson on the Occasion of His 60th Birthday*, ed. L. Varcl and R. F. Willetts in collaboration with B. Borecký, J. Burian, J. Frel, and J. Pečírka (Prague: Charles

Michael Psellus but may ultimately derive from the *Chrestomathia* of Proclus. Sections 1–3 treat the subjects, parts, and structure of tragedy. Section 4 observes that both the actors and the chorus use song and speech; choral song is then divided into five parts: parodos, stasimon, emmeleia, kommos, and exodos. In respect to choral song, section 7 defines the strophe (στροφή) in tragedy as "periodic" or "antistrophic." The description is too brief to be entirely clear, but the type composed of periods would seem to be one that made use of many different rhythmic patterns. The antistrophic type, of course, either repeats a metric pattern without an epode (monostrophic) or repeats it and includes an epode (epodic), which uses a different but related pattern. Antistrophic types can also modulate from one monostrophic type to another, from one epodic type to another, and from monostrophic to epodic and the converse.[153]

The tradition of antistrophic structure in the tragic chorus is also noted in the Aristotelian *Problemata* 19.15, where the imitative style of the dithyramb was adduced as a reason for the decline of this structure. In the second part of the problem, it is observed that the choruses had traditionally been composed of free citizens who naturally found it easier to sing strophic compositions in which the mele were simpler and a single rhythm and meter were employed. The compositions for the actors, by contrast, were not antistrophic because they were for professional artists who were able to handle more complex imitative music.

If the chorus played a major role in the earliest stages of the drama, it occupies but a quarter of the length in the tragedies of

---

University, 1963), 67–81. A more recent study of its contents appears in Giovanni Comotti, "La musica nella tragedia greca," in *Scena e spettacolo nell'antichità. Atti del Convegno Internazionale di Studio Trento, 28–30 marzo 1988*, ed. Lia de Finis (Firenze: Olschki, 1989), 43–61.

[153] Browning thinks the presence of emmeleia in section 4 is peculiar because the term is also applied to one of the dances used in tragedy. Pollux *Onomasticon* 4.53 includes the term in a long list of terms applied to poems, odes, songs, and meters, but this does not mean, as Browning (p. 72) supposes, that it "cannot refer to the tragic dance of that name." As the emmeleia probably did include choral song as well as dance, it could well be considered one of the parts of choral song. See p. 101 *infra*. The definitions in section 7 tend to follow Aristides Quintilianus *De musica* 1.14 (for the period) and 1.29 (for the strophe) and Hephaestion *Poem.* 4 (Consbruch 66–69). See also Dionysius of Halicarnassus *De compositione verborum* 19 (Roberts 194.5–13).

Sophocles and Euripides. The chorus must originally have functioned as an integral part of the tragedy, although by the end of the fourth century B.C.E., the practice of composing choruses that could be transferred from play to play—and thus would hardly participate in the drama itself—was becoming common. On this point, Aristotle observes in the *Poetica*:

> It is necessary that the chorus be considered one of the actors, be a part of the whole, and share in the action, as is done by Sophocles but not Euripides. As for the rest, their songs have no more to do with the story than with any other tragedy. They sing embolima, which Agathon first began. And what is the difference between singing embolima and fitting a speech (or even a complete episodion) from one play into another?[154]

Horace's *Ars poetica,* though nearly three centuries later than Aristotle, confirms the central dramatic role of the chorus and states that it should "sing nothing between acts that does not advance and aptly fit the plot."[155]

Unlike the large circular dithyrambic chorus, the chorus in tragedy was arranged in a rectangle and numbered between twelve and fifteen singers, while the chorus in comedy included twenty-four members. In tragedy, the chorus was sometimes divided into two parts. The rectangle of the chorus consisted of five columns (ζυγά) and three lines (στοῖχοι) in tragedy and six columns and four lines in comedy.[156] The better singers were on the outer lines, the weaker in the middle. The koruphaios was positioned in the middle column of the front line; he was also known as the protostates (πρωτοστάτης) or, with reference to his position in the rectangle, the "third on the left" (τρίτος ἀριστεροῦ). The koruphaios's two assistants, parastatai (παραστάται), stood on either side of him in the front line.

---

[154] καὶ τὸν χορὸν δὲ ἕνα δεῖ ὑπολαβεῖν τῶν ὑποκριτῶν, καὶ μόριον εἶναι τοῦ ὅλου καὶ συναγωνίζεσθαι μὴ ὥσπερ Εὐριπίδῃ ἀλλ' ὥσπερ Σοφοκλεῖ. τοῖς δὲ λοιποῖς τὰ ᾀδόμενα ⟨οὐδὲν⟩ μᾶλλον τοῦ μύθου ἢ ἄλλης τραγῳδίας ἐστίν· διὸ ἐμβόλιμα ᾄδουσιν πρώτου ἄρξαντος Ἀγάθωνος τοῦ τοιούτου. καίτοι τί διαφέρει ἢ ἐμβόλιμα ᾄδειν ἢ εἰ ῥῆσιν ἐξ ἄλλου εἰς ἄλλο ἁρμόττοι ἢ ἐπεισόδιον ὅλον; (18 [1456a25–32; Butcher 68]). Agathon was a slightly younger contemporary of Euripides and very much associated with the progressive stylists. His victory of 416 B.C.E. is celebrated in Plato *Symposium* 198a; Aristophanes parodies his style in *Thesmophoriazusae* 101ff. The practice of embolima is certainly a remarkable foreshadowing of similar practices of *pasticcio* in eighteenth-century opera and American musical comedy.

[155] "neu quid medios intercinat actus | quod non proposito conducat et haereat apte" (194–95 [Fairclough 466]).

[156] Pollux *Onomasticon* 4.107–9.

When processing, the chorus might move either by column or by line. During the parodos, the chorus, preceded by the aulete, might move around the orchestra before finally assuming a position. The parodos and the stasimon were probably sung by the entire chorus in unison, but the kommos might have made use of various combinations within the chorus and between the chorus and the actors.[157]

The chorus and the actors wore masks, but the aulete, for obvious reasons, did not.[158] The chorus and actors heightened the text and music not only in the selection of masks but also in their use of dance, gesture, and vocal inflection. It is probable that the same sorts of imitative motions, forms, and pointings were used in the drama as in the hyporcheme.[159] Three broad types of dance are identified by Aristoxenus in a fragment from his lost book on the subject: a tragic type, emmeleia (ἐμμέλεια); a type used in the satyr plays, sikinnis (σίκιννις); and a type used in comedy, kordax (κόρδαξ).[160] Emmelia suggests a graceful, harmonious, and dignified style, and Plato confirms this definition in *Leges* 7 (816a–b). By contrast, the sikinnis and the kordax were vigorous and energetic dances. The kordax, in particular, was associated with drunkenness and lasciviousness. Psellus's *De tragoedia* 11, which refers to these same three dances, adds that only the chorus danced, never the actors.

The actors spoke some parts of the tragedy, sung other parts with instrumental accompaniment, and participated with the chorus in the kommoi. It is not certain what instrument or combination of instruments accompanied the actors on stage.

---

[157] Pickard-Cambridge, *Dramatic Festivals*, 232–46. Psellus *De tragoedia* 12 also confirms that the chorus is accompanied by an aulete.

[158] An extended treatment of masks appears in Pollux *Onomasticon* 4.133–54.

[159] Athenaeus (*Deipnosophistae* [14.26–30]), following Aristoxenus, and Lucian (*De saltatione* 36–61) elaborates considerably on a number of tragic and comic forms (σχήματα).

[160] Aristoxenus fr. 104 (Fritz Wehrli, *Aristoxenos*, 2d ed., Die Schule des Aristoteles, vol. 2 [Basel: Schwabe, 1967], 35). See also fr. 103 and 105–12; Athenaeus *Deipnosophistae* 14.28 (630b–e); and Pollux *Onomasticon* 4.99. These same three dances are associated with Dionysus by Lucian (*De saltatione* 22 and 26).

Although there are references to the music of the lyre and the kithara in tragedy,[161] these do not necessarily mean that the instruments were present in the performance. On the other hand, the skeptic philosopher Sextus Empiricus specifically states in *Adversus musicos* 13:

> the epics of Homer in ancient times were sung to the lyre. In like manner are the mele and the stasima by the tragedians, which contain a natural ratio, such as the stasima so spoken:
>
> Greatest Earth and divine Ether,
> He is begetter of men and gods;
> And she, while receiving water-bearing
> Drops of moisture, bears mortals;
> She bears food and races of beasts;
> Wherefore not unjustly is she esteemed
> As the mother of all.[162]

Sextus Empiricus's quotation is derived from Euripides's *Chrysippos* (fr. 839), and if Sextus Empiricus is a reliable witness on this point, it may be that Euripides's use of the lyre in this play is another example of his innovative style.

Although a late witness, Psellus's *De tragoedia* 12 supports Sextus Empiricus in associating the use of the kithara in tragedy with Sophocles and Euripides, but of greater interest, it comments elsewhere (9) on four other features of tragic melos and meter: the mesaulion (μεσαύλιον), epiphthegma (ἐπίφθεγμα), anaboëma (ἀναβόημα), and the rhythmic anapestic (ἀνάπαιστον ἔρρυθμον). The mesaulion is described as a short instrumental interlude between the mele.[163] The epiphthegma itself is not described, but it is observed that epiphthegmata, while used in tragedy, are more common in satyr plays. Athenaeus, however, refers to the paeanic epiphthegma ("Ie Paean"), and Hephaestion, in more general terms, describes such an interjection as epiphthegmatic. The Ie Paean, of course, has already been encountered in the Homeric hymn *In Apollinem*, where it is ascribed to the Cretan paean singers, and in Timotheus's *Persae*.[164] The anaboëma is said to be a type of singing between song as such and recitation; thus, it would seem to be a synonym for the parakataloge attributed to Archilochus by the Plutarchean Soterichus.[165] Psellus's definition of the rhythmic anapestic probably refers to passages delivered either by the chorus in front of the skene (ἐπίσκηνα) or by an onstage chorus (ἀπὸ σκηνῆς), associated with the announcements of messengers or the entrance of the chorus in the parodos. The use of anapestic rhythm in the parodos is of course common and there are instances of onstage choruses in the plays of Euripides, but there are no anapestic messengers' speeches in surviving tragedy.

---

[161] Especially in the famous parody in Aristophanes *Ranae* 1286 of the strumming sound of the kitharoedic nomos: τοφλαττοθρατ (see pp. 123–24 *infra*). On the respective associations of the aulos and kithara in drama, see Lukas Richter "Instrumentalbegleitung zur attischen Tragödie," *Das Altertum* 24 (1978): 150–59.

[162] καὶ τὰ Ὁμήρου ἔπη τὸ πάλαι πρὸς λύραν ᾔδετο. ὡσαύτως δὲ καὶ τὰ παρὰ τοῖς τραγικοῖς μέλη καὶ στάσιμα, φυσικόν τινα ἐπέχοντα λόγον, ὁποῖά ἐστι τὰ οὕτω λεγόμενα· γαῖα μεγίστη καὶ Διὸς αἰθήρ | ὁ μὲν ἀνθρώπων καὶ θεῶν γενέτωρ, | ἡ δ' ὑγροβόλους σταγόνας νοτίας | παραδεξαμένη τίκτει θνατούς, | τίκτει δὲ βορὰν φῦλά τε θηρῶν, | ὅθεν οὐκ ἀδίκως | μήτηρ πάντων νενόμισται (Sextus Empiricus, *ΠΡΟΣ ΜΟΥΣΙΚΟΥΣ, Against the Musicians [Adversus musicos]*, ed. and trans. Denise Davidson Greaves, Greek and Latin Music Theory, vol. 3 [Lincoln: University of Nebraska Press, 1986], 138–39). Sextus Empiricus lived in the latter part of the second or the first part of the third century C.E.

A certain number of specifically musical details can be added to this view of the structure of the drama and the roles played by the actors and the chorus. Section 5 of Psellus's *De tragoedia* provides a number of remarkable observations about the use of genera, tonoi, and scales that are unattested elsewhere.[166] He states that the "ancient tragic melic composition" employed the enharmonic genus mixed and unmixed with the diatonic; on the other hand, the chromatic genus—and specifically the soft chromatic genus—was first used in tragedy by Euripides. In respect to the tonoi, the ancients primarily composed in the Dorian and Mixolydian, but they also used some of the so-called relaxed tonoi, such as the Iastian and the Relaxed Lydian. Sophocles was the first to make use of the Lydian and the Phrygian, which was used "dithyrambically," while Agathon introduced the Hypodorian and Hypophrygian, which are especially suited to the dithyramb. The scales used by the ancients were smaller, that is, limited in number of notes, but Euripides employed many notes (πολυχορδία) and his style of melic composition was called by the ancient musicians *anatretos* (ἀνάτρητος), i.e., bored through and through like an ant-hill. Finally, he observes that Euripides was also known for using many different species and shades of the musical scales, as well as "suitable" rhythms such as simple and double Bacchic, lesser ionic, and proceleusmatic.[167]

---

[163] A similar definition is given in Aristides Quintilianus *De musica* 1.11, although the term is adjectival (μεσαυλικά) here.

[164] Athenaeus *Deipnosophistae* 15.52 (696f); Hephaestion *Poem.* 7.3 (+ A scholia) (Consbruch 71–72 and 174.12–13). On the Homeric hymn and the *Persae*, see pp. 37 and 70 *supra*.

[165] See p. 73 *supra*.

[166] See chapters 4–6 for a full treatment of these technical parts of music theory.

Most of these observations accord with other early sources, and of course, it is quite possible that Psellus—or his intermediate source, perhaps Proclus—derived his material from these same early authorities. For example, the Plutarchean Soterichus—apparently on the authority of Aristoxenus—also states that tragedy did not employ the chromatic genus and observes that Aeschylus and Phrynichus avoided it on purpose; he quite deliberately ignores Euripides. Soterichus ascribes to Sappho the invention of the Mixolydian tonos, which he characterizes as emotional, and remarks that the tragedians adopted it to use in combination with the Dorian tonos, which is characterized as grand and dignified. The combination was appropriate, he states, because tragedy is a combination of passion and grandeur. In this same passage, Soterichus refers as well to the Relaxed Lydian and Iastian tonoi. In his *Quaestiones convivales,* Plutarch states that Agathon was the first to introduce the chromatic genus into tragedy, but this passage does not refer to his use of the Hypodorian and Hypophrygian tonoi.[168] As Agathon was a contemporary of Euripides and certainly associated with the progressive style, it was probably a matter of opinion which of them might claim priority in the use of the chromatic genus. A primary theme of Soterichus's part of the Plutarchean dialogue on music concentrates on the point that the simpler style of music was preferred by the earlier poets, the more complex style by the younger innovators. Soterichus then criticizes these innovations in his quotation of an excerpt from the *Cheiron* of Pherecrates.[169] As to the terms used to describe the complexity of Euripides's style, Plato too employs the term πολυχορδία to censure this style, especially in association with the aulos.[170] The resonator of the aulos is, of course, drilled with various fingerholes, and as the aulos is commonly associated with the more elaborate musical styles, the term *anatretos* provides a clever play on words. The species and shades of the musical scales are described in any number of the musical treatises, and the rhythms in the metric treatises. A single treatise, however, draws all this material together: the *De musica* of Aristides Quintilianus; Psellus may very well have made use of this single source.[171]

---

[167] Ἡ δὲ παλαιὰ τραγικὴ μελοποιία γένει μὲν τῷ ἐναρμονίῳ ἐχρήσατο ἀμιγεῖ καὶ μικτῷ ἐνικῆς ἁρμονίας καὶ διατόνων, χρώματι δὲ οὐδεὶς φαίνεται κεχρημένος τῶν τραγικῶν ἄχρις Εὐριπίδου· μαλακὸν γὰρ τὸ ἦθος τοῦ γένους τούτου. τῶν δὲ τόνων πλεῖστον μὲν ἡ παλαιὰ κέχρηται τῷ τε Δωρίῳ καὶ τῷ Μιξολυδίῳ, τῷ μὲν ὡς συμνότητος οἰκείῳ, τῷ δὲ Μιξολυδίῳ ὡς συνεργῷ πρὸς τοὺς οἴκτους. κέχρηται δὲ καὶ ταῖς ἀνειμέναις τότε καλουμέναις ἁρμονίαις, τῇ τε Ἰαστὶ καὶ ἀνειμένῃ Λυδιστί. τοῦ δὲ Φρυγίου καὶ Λυδίου Σοφοκλῆς ἥψατο πρῶτος. κέχρηται δὲ τῷ Φρυγίῳ διθυραμβικώτερον. ὁ δὲ Ὑποφρύγιος καὶ ὁ Ὑποδώριος σπάνιοι παρ' αὐτῇ εἰσιν, ὡς ... διθυράμβῳ προσήκοντες. πρῶτος δὲ Ἀγάθων τὸν Ὑποδώριον τόνον εἰς τραγῳδίαν εἰσήνεγκεν καὶ τὸν Ὑποφρύγιον. ὅ γε μὴν Λύδιος τῷ κιθαρῳδικῷ τρόπῳ οἰκειότερός ἐστι. συστήμασι δὲ οἱ μὲν παλαιοὶ μικροῖς ἐχρῶντο, Εὐριπίδης πρῶτος πολυχορδίᾳ ἐχρήσατο. ἐκαλεῖτο ὑπὸ τῶν μουσικῶν ⟨τῶν⟩ παλαιῶν ἀνάτρητος ὁ τρόπος οὗτος τῆς μελοποιίας· καὶ καθόλον εἰπεῖν Εὐριπίδης πολυειδέστερός ἐστι τῶν πρὸ αὐτοῦ καὶ πολυχρούστερος, καὶ ἐχρήσατο καὶ τοῖς προσήκουσι ῥυθμοῖς, καὶ βακχείοις ἁπλοῖς τε καὶ διπλοῖς, καὶ τῷ ἀπ' ἐλάττονος ἰωνικῷ, καὶ ἐπ' ὀλίγον προκελευσματικῷ (Browning, 69). Browning follows the suggestion of R. P. Winnington-Ingram in emending the manuscript reading ἐνικῆς ἁρμονίας to γένει τῆς ἁρμονίας, but I have restored the original reading in this note as preferable. The "harmonia" in its earliest sense was simple and unified (ἐνικός), unlike the other genera, which had various shades. The sense of ἀνάτρητος is derived from Plutarch's use of the term ἀνατρήσεις (*Terrestriane an aquatilia animalia sint callidiora* 968b2) in his description of anthills.

---

[168] Plutarch *De musica* 1136d–e and 1137e–f (Ziegler 13.14–14.4 and 16.14–25); *Quaestiones convivales* 3.1 (645e). Sappho fl. 6th century B.C.E. Plutarch refers to Euripides's use of the Mixolydian tonos in *De recta ratione audiendi* 46b. On the use of Hypodorian and Hypophrygian tonoi in tragedy by the actors but not by the chorus, see Aristotle *Problemata* 19.30 and 48 (920a8–10 and 922b10–28).

[169] See pp. 66–67 *supra.*

[170] Plato *Respublica* 3.10 (399c–d).

[171] Aristides Quintilianus *De musica* 1.9 and 15–17. On the species and shades, see also Aristoxenus *Harmonica* (*Aristoxeni Elementa harmonica,* ed. Rosetta da Rios [Romae, typis publicae officinae polygraphicae, 1954], 28.3–35.8 and 62.14–65.20), Cleonides *Harmonica introductio* 6–7, Nicomachus *Manuale harmonices* 12, Bacchius *Introductio artis musicae* 22–24, Gaudentius *Harmonica introductio* 5, Bellermann's Anonymous 52–57 (Dietmar Najock, *Drei anonyme griechische Traktate über die Musik. Eine kommentierte Neuausgabe des Bellermannschen Anonymus* [Kassel: Bärenreiter, 1972], 104.8–106.17), and Bryennius *Harmonica* 1.7. On the rhythms, see Bacchius *Introductio artis musicae* 99–101 and Hephaestion *Ench.* 3 (+ scholia) (Consbruch 10–12).

Horace, too, aligns himself with the conservative tradition in the *Ars poetica,* where he is particularly biting in his association of the aulos (tibia) with the new style, which he decries as vulgar:

> The aulos—not, as now, bound with brass and a rival of the trumpet, but slight and simple, with few holes—was once of use to lead and aid the chorus and to fill with its breath benches not yet crowded, where, to be sure, folk gathered, easy to count, because few—sober folk, too, chaste and modest. But when a conquering race began to widen its domain, and an ampler wall embraced its cities, and when, on festal days, appeasing the Genius by daylight drinking brought no penalty, then both time and tune won greater licence. For what taste could you expect of an unlettered throng just freed from toil, rustic mixed up with city folk, vulgar with nobly-born? So to the early art the aulete added movement and display, and, strutting o'er the stage, trailed a robe in train. So, too, to the sober lyre new tones were given, and an impetuous style brought in an unwonted diction; and the thought, full of wise saws and prophetic of the future, was attuned to the oracles of Delphi.[172]

This is not the place to develop hypothetical analyses of the structure of the plays of Aeschylus, Sophocles, Euripides, and Aristophanes.[173] Scholars—ancient and modern—differ among themselves about the precise points of structural demarcation, but suffice it to say that it is quite possible to discover in the plays examples of many of the general features and characteristics described above.[174] Likewise, self-conscious references to music, common in all the other musico-poetic types, appear in the tragedy and especially in the comedies of Aristophanes.[175] Sometimes the references are general, as in the first antistrophe of this chorus from Sophocles's *Trachiniae*:

---

[172] *Ars poetica* 202–19: "Tibia non, ut nunc, orichalco vincta tubaeque | aemula, sed tenuis simplexque foramine pauco | adspirare et adesse choris erat utilis atque | nondum spissa nimis complere sedilia flatu; | quo sane populus numerabilis, utpote parvus, | et frugi castusque verecundusque coibat. | postquam coepit agros extendere victor et urbes | latior amplecti murus, vinoque diurno | placari Genius festis impune diebus, | accessit numerisque modisque licentia maior. | indoctus quid enim saperet liberque laborum | rusticus urbano confusus, turpis honesto? | sic priscae motumque et luxuriem addidit arti | tibicen traxitque vagus per pulpita vestem; | sic etiam fidibus voces crevere severis, | et tulit eloquium insolitum facundia praeceps, | utiliumque sagax rerum et divina futuri | sortilegis non discrepuit sententia Delphis" (Fairclough 466–69). This is Fairclough's translation, with the exception that I have read "aulos" and "aulete" for his "flute" and "flute-player."

[173] Aeschylus was born in 525 or 524 and died in 456 B.C.E.; Sophocles, ca. 496–406 B.C.E.; Euripides, ca. 485–406 (or perhaps late 407) B.C.E.; and Aristophanes, 457/445–386/385 B.C.E.

[174] Cf., as examples of scholars whose views are generally compatible, the treatments in Pickard-Cambridge, *Dramatic Festivals,* and T. B. L. Webster, *The Greek Chorus* (London: Methuen, 1970). On the influence of the nomos on Aeschylus, see Thomas J. Fleming, "The Musical Nomos in Aeschylus' *Oresteia,*" *Classi-*

> Soon shall the glorious voice of the aulos go up for you again, resounding with no harsh strain of grief, but with such music as the lyre makes to the gods! For the son whom Alcmena bore to Zeus is hastening homeward, with the trophies of all prowess.[176]

Sometimes they are more specific, as elsewhere in the same play when the maiden chorus sings a paean, perhaps recalling as well the character of the partheneia:

> Let the maidens raise a joyous strain for the house, with songs of triumph at the hearth; and, amidst them, let the shout of men go up with one accord for Apollo of the bright quiver, our Defender! And at the same time, ye maidens, lift up a paean, cry aloud to his sister, the Ortygian Artemis, smiter of deer, goddess of the twofold torch, and to the Nymphs her neighbors!
>
> My spirit soars; I will not reject the wooing of the aulos. O thou sovereign of my soul! Lo, the ivy's spell begins to work upon me! Euoe! even now it moves me to whirl in the swift dance of Bacchanals!
>
> Io, io Paean! see, dear lady, see! Behold, these tidings are taking shape before thy gaze.[177]

---

cal Journal 72 (1977): 222–33. On the structure of the comedy, see n. 150 *supra*. A remarkable attempt at performing Greek drama with costumes, masks, music, and dance can be seen in the videotape production (© 1986) of Euripides's *Medea* by the New York Greek Drama Company (25 Commerce Street, New York, NY 10014), under the direction of Peter Steadman. The play is delivered in Greek, with music written by Eve Beglarian in the style of the surviving fragments of ancient Greek music.

[175] A handy collection of some but by no means all of these appear in Barker, *Greek Musical Writings*, 1:63–92. For an important discussion of the larger philosophical role played by music in the work of Aristophanes, see Evanghélos Moutsopoulos, "La philosophie de la musique et le théâtre d'Aristophane," in *Χάρις: Κωνσταντίνῳ Ἰ. Βουβέρῃ· ἀφιέρωμα τῶν μαθητῶν τοῦ ἐπὶ τῇ ἑξηκονταπενταετηρίδι τοῦ βίου αὐτοῦ* (Ἀθῆναι: [Ἀδελφοὶ Μυρτίδη], 1964), 201–37.

[176] Lines 640–46: ὁ καλλιβόας τάχ' ὑμὶν | αὐλὸς οὐκ ἀναρσίαν | ἀχῶν καναχὰν ἐπάνεισιν, | ἀλλὰ θείας ἀντίλυρον μούσας. | ὁ γὰρ Διὸς Ἀλκμήνας κόρος | σοῦται πάσας ἀρετᾶς | λάφυρ' ἔχων ἐπ' οἴκους· (translation adapted from Sir Richard C. Jebb in *Aeschylus, Sophocles, Euripides, Aristophanes* [Chicago: Encyclopaedia Britannica, 1952], 175). *Trachiniae* was probably produced around 440 B.C.E.

[177] Lines 205–23: ἀνολολυξάτω δόμοις ἐφεστίοις | ἀλαλαγαῖς ἁ μελλόνυμφος, ἐν δὲ | κοινὸς ἀρσένων ἴτω | κλαγγὰ τὸν εὐφαρέτραν | Ἀπόλλω προστάταν· ὁμοῦ δὲ | παιᾶνα παιᾶν' ἀνάγετ', ὦ παρθένοι, | βοᾶτε τὰν ὁμόσπορον | Ἄρτεμιν Ὀρτυγίαν | ἐλαφαβόλον ἀμφίπυρον, | γείτονάς τε Νύμφας. | ἀείρομαι οὐδ' ἀπωσομαι | τὸν αὐλόν, ὦ τύραννε τᾶς ἐμᾶς φρενός, | ἰδού μ' ἀναταράσσει, | εὐοῖ μ', | ὁ κισσὸς ἄρτι βακχίαν

The cries of "Euoe" and "Io Paean" illustrate the epiphthegmata described in Psellus's *De tragoedia*.

Musical forms such as the kommos can also be identified, and these clearly illustrate the highly dramatic effect created by the antiphonal exchange between the actor and the chorus. The kommos between the chorus and Xerxes in Aeschylus's *Persae* is elided with the exodos and builds up to a tremendous climax though a group of seven strophes and antistrophes and an epode. Beginning with the sixth strophe, specific references are made to the action taking place on stage and in the orchestra:

> strophe 6
> **Xerxes:** Weep, weep over our calamity, and depart to your homes.
> **Chorus:** Alas, alas, woe, woe!
> **Xerxes:** Cry now aloud in response to me.
> **Chorus:** A wretched offering from the wretched to the wretched.
> **Xerxes:** Cry out, tuning your strain to mine.
> **Chorus:** Otototototoi! Grievous indeed is this visitation. Alas, indeed, for this your woe too I suffer.
> antistrophe 6
> **Xerxes:** Ply your strokes, ply your strokes, and groan for my sake.
> **Chorus:** I weep in lamentation!
> **Xerxes:** Cry now aloud in response to me.
> **Chorus:** This care, my liege, is mine.
> **Xerxes:** Lift up now your voice in lamentation.
> **Chorus:** Otototototoi! And with our wailing, alas, shall be mingled blackening blows and shrieks of pain.
> strophe 7
> **Xerxes:** Beat your breast too, and raise the Mysian wail.
> **Chorus:** Anguish, anguish!
> **Xerxes:** And tear, I pray you, the white hair from out your beard.
> **Chorus:** With clenched nails, with loud wailing.
> **Xerxes:** And utter shrill cries.
> **Chorus:** This too will I do.
> antistrophe 7
> **Xerxes:** And with your fingers rend the robe that drapes you.
> **Chorus:** Anguish, anguish!
> **Xerxes:** And pluck out your locks and lament our host.
> **Chorus:** With clenched nails, with clenched nails, with loud wailing.
> **Xerxes:** Let tears moisten your eyes.
> **Chorus:** I am steeped in tears.

| ὑποστρέφων ἅμιλλαν. ἰὼ ἰὼ Παιάν. | ἴδ’, ὦ φίλα γύναι, | τάδ’ ἀντίπρῳρα δή σοι | βλέπειν πάρεστ’ ἐναργῆ (translation adapted from Jebb, 171–72). See also Evanghélos Moutsopoulos, "Sophocle et la philosophie de la musique," *Annales de la Faculté des Lettres et Sciences Humaines d'Aix* 33 (1959): 107–38.

epode
Xerxes: Cry now aloud in response to me.
Chorus: Oioi, oioi!
Xerxes: With sounds of wailing wend you to your homes.
Chorus: Io, io!
Xerxes: Io! through the city.
Chorus: Io, indeed! yea, yea.
Xerxes: Pour forth your wail as you move on with dainty steps.
Chorus: Io, io! O Persian land, grievous now to tread!
Xerxes: Ie, ie! Those that perished in three-tiered galleys, ie, ie!
Chorus: I will escort you with dismal sounds of woe.[178]

Musical references are even more abundant in the plays of Euripides, perhaps because Euripides placed greater emphasis on the music in his work. Both Sextus Empiricus and Psellus's *De tragoedia* associate the particular use of the kithara in tragedy with Sophocles and Euripides, and it is noteworthy that while the root κιθαρ appears appears only once in the plays of Aeschylus and once in a fragment of Sophocles, it appears seventeen times in the plays and fragments of Euripides.[179] A typical example of Euripides's abundant musical allusions is this strophe of the chorus (1036–57) in *Iphigenia Aulidensis*, produced posthumously in 405 B.C.E.:

---

[178] Lines 1038–76: Ξέρξης. δίαινε δίαινε πῆμα· πρὸς δόμους δ' ἴθι. | Χορός. αἰαῖ αἰαῖ, δύα δύα. | Ξέρξης. βόα νυν ἀντίδουπά μοι. | Χορός. δόσιν κακὰν κακῶν κακοῖς. | Ξέρξης. ἴυζε μέλος ὁμοῦ τιθείς. | Χορός. ὀτοτοτοτοῖ. | βαρεῖά γ' ἅδε συμφορά. | οἳ μάλα καὶ τόδ' ἀλγῶ. | Ξέρξης. ἔρεσσ' ἔρεσσε καὶ στέναζ' ἐμὴν χάριν. | Χορός. διαίνομαι γοεδνὸς ὤν. | Ξέρξης. βόα νυν ἀντίδουπά μοι. | Χορός. μέλειν πάρεστι, δέσποτα. | Ξέρξης. ἐπορθίαζέ νυν γόοις. | Χορός. ὀτοτοτοτοῖ. | μέλαινα δ' ἀμμεμείξεται, | οἵ, στονόεσσα πλαγά. | Ξέρξης. καὶ στέρν' ἄρασσε κἀπιβόα τὸ Μύσιον. | Χορός. ἄνι' ἄνια. | Ξέρξης. καί μοι γενείου πέρθε λευκήρη τρίχα. | Χορός. ἄπριγδ' ἄπριγδα μάλα γοεδνά. | Ξέρξης. ἀύτει δ' ὀξύ. | Χορός. καὶ τάδ' ἔρξω. | Ξέρξης. πέπλον δ' ἔρεικε κολπίαν ἀκμῇ χερῶν. | Χορός. ἄνι' ἄνια. | Ξέρξης. καὶ ψάλλ' ἔθειραν καὶ κατοίκτισαι στρατόν. | Χορός. ἄπριγδ' ἄπριγδα μάλα γοεδνά. | Ξέρξης. διαίνου δ' ὄσσε. | Χορός. τέγγομαί τοι. | Ξέρξης. βόα νυν ἀντίδουπά μοι. | Χορός. οἰοῖ οἰοῖ. | Ξέρξης. αἰακτὸς ἐς δόμους κίε. | Χορός. ἰὼ ἰώ. | Ξέρξης. ἰωὰ δὴ κατ' ἄστυ. | Χορός. ἰωὰ δῆτα, ναὶ ναί. | Ξέρξης. γοᾶσθ' ἁβροβάται. | Χορός. ἰὼ ἰώ, Περσὶς αἶα δύσβατος. | Ξέρξης. ἰὴ ἰὴ τρισκάλμοισιν, | ἰὴ ἰή, βάρισιν ὀλόμενοι. | Χορός. πέμψω τοί σε δυσθρόοις γόοις (translation adapted from *Aeschylus*, 2 vols., trans. Herbert Weir Smyth, Loeb Classical Library [Cambridge: Harvard University Press, 1922], 1:200–207). *Persae* was produced in 472 B.C.E.

[179] In Aeschylus *Supplices* 681 (there are two additional appearances in the Aeschylus fragment in Hesychius *Lexicon* 2.337); in a Sophocles fragment (15.1); and in Euripides *Cyclops* 444, *Alcestis* 582 (there is also a reference to the barbiton at 345), *Hercules furens* 350, *Ion* 882 and 905, *Iphigenia Taurica* 1238, *Bacchae* 562, *Iphigenia Aulidensis* 1037, and in various fragments.

> What hymenaios was that which raised its strains to the sound of the Libyan aulos, to the music of the dancer's kithara, to the reed of the syrinxes?
>
> 'Twas in the day the fair-tressed Pierides came over the slopes of Pelion to the marriage-feast of Peleus, beating the ground with the print of golden sandals at the banquet of the gods and celebrating in melodious sounds Thetis and the son of Æacus, over the Centaurs' hill, down through the woods of Pelion.
>
> There was the Dardanian boy, Phrygian Ganymede, whom Zeus delights to honor, drawing off the wine he mixed in the depths of golden bowls; while, along the gleaming sand, the fifty daughters of Nereus graced the marriage with their dancing, circling in a mazy ring.[180]

In Euripides's *Alcestis,* the chorus tells of the lions and fawns coming to dance around the kithara of the Pythian Apollo when he dwelt in the palace of Admetus; in *Hercules furens,* the chorus refers to Apollo singing a dirge, "striking his kithara with a golden plectrum"; and in *Ion,* Creusa rebukes Apollo, "who sings to the sound of the seven-note kithara."[181]

As it happens, the two earliest surviving Greek musical fragments come from two of Euripides's plays: *Orestes,* produced in 408 B.C.E., and *Iphigenia Aulidensis.* Given his difficult and progressive musical style, it would be surprising if special effort had not been taken to preserve some of this music, but whether these particular fragments do in fact represent Euripides's original music cannot be firmly determined. In any event, the style of the music they preserve certainly accords with descriptions of Euripides's style.

---

[180] Lines 1036–57: τίς ἄρ' ὑμέναιος διὰ λωτοῦ Λίβυος | μετά τε φιλοχόρου κιθάρας | συρίγγων θ' ὑπὸ καλαμοεσ|σᾶν ἔστασεν ἰαχάν, | ὅτ' ἀνὰ Πήλιον αἱ καλλιπλόκαμοι | Πιερίδες παρὰ δαιτὶ θεῶν | χρυσεοσάνδαλον ἴχνος | ἐν γᾷ κρούουσαι | Πηλέως εἰς γάμον ἦλθον, | μελῳδοῖς Θέτιν ἀχήμασι τόν τ' Αἰακίδαν | Κενταύρων ἀν' ὄρος κλέουσαι | Πηλιάδα καθ' ὕλαν. | ὁ δὲ Δαρδανίδας, Διὸς | λέκτρων τρύφημα φίλον, | χρυσέοισιν ἄφυσσε λοιβὰν | ἐν κρατήρων γυάλοις, | ὁ Φρύγιος Γανυμήδης. | παρὰ δὲ λευκοφαῆ ψάμαθον | εἰλισσόμεναι κύκλια | πεντήκοντα κόραι γάμους | Νηρέως ἐχόρευσαν (translation adapted from Edward P. Coleridge in *Aeschylus, Sophocles, Euripides, Aristophanes,* 434). On the hymenaios (a wedding song), see pp. 126–31 *infra;* on the Pierides, cf. the paean of Limenios (pp. 47–48 *supra*).

[181] *Alcestis* 580–82: ἔβα δὲ λιποῦσ' Ὄθρυος νάπαν λεόντων | ἁ δαφοινὸς ἴλα· | χόρευσε δ' ἀμφὶ σὰν κιθάραν,...; *Hercules furens* 350–51: τὸν κάλλει φθιτόν, κιθάραν | ἐλαύνων πλήκτρῳ χρυσέῳ·; *Ion* 881–82: ὦ τᾶς ἑπταφθόγγου μέλπων | κιθάρας ἐνοπάν, ... *Alcestis* was produced in 438 B.C.E.; *Hercules furens,* ca. 417; and *Ion,* ca. 410.

The earliest fragment, *P.Leid.* Inv. 510, is a small scrap of papyrus dating from ca. 280 B.C.E. The scrap, which measures approximately 6 x 7.5 cm, comes from the left side of a roll and records sixteen lines of text and musical notation from *Iphigenia Aulidensis* (figure 6).[182] The text and notation are badly deteriorated but can be reconstructed (figure 7).

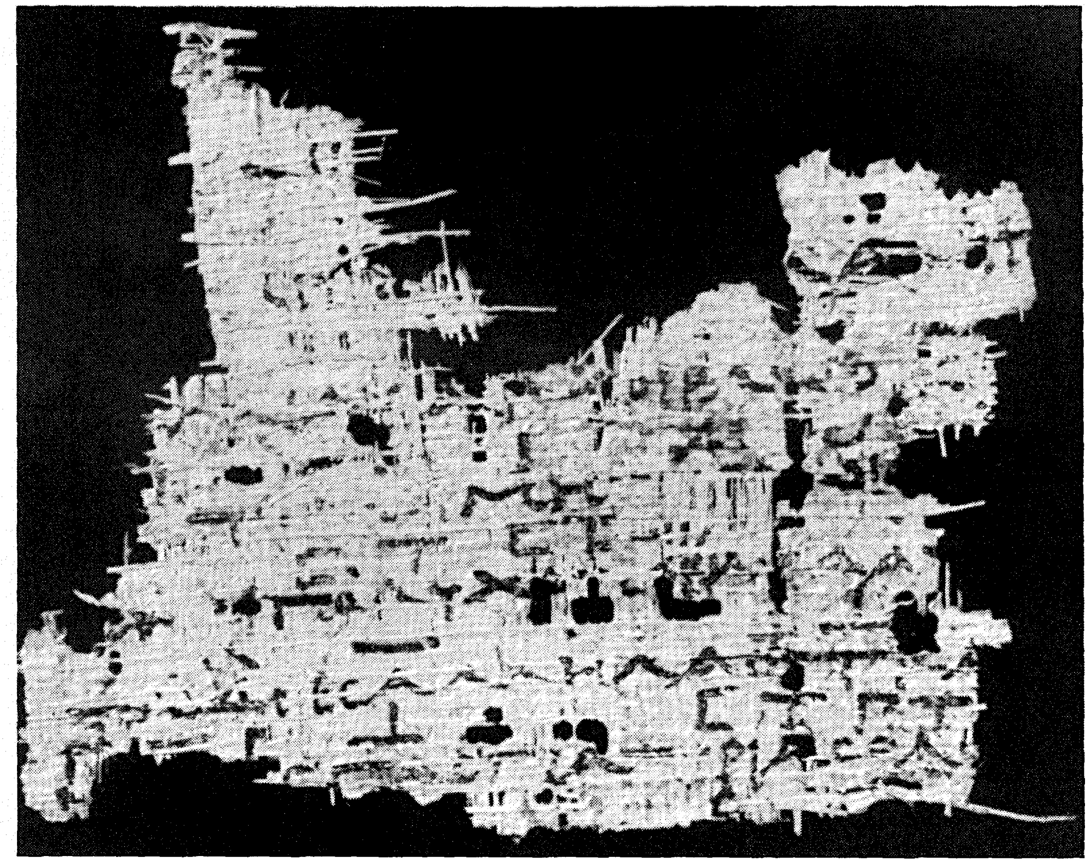


Figure 6.

---

[182] The fragment, which is preserved in the Papyrological Institute of the Rijksuniversiteit in Leiden, was first reported by Denise Jourdan-Hemmerdinger, "Un nouveau papyrus musical d'Euripide (présentation provisoire)," *Comptes-rendus de l'Académie des Inscriptions et Belles-Lettres* (1973): 292–302; a later and somewhat more comprehensive treatment appeared in Giovanni Comotti, "Words, Verse and Music in Euripides' Iphigenia in Aulis," *Museum philologum Londinense* 2 (1977): 69–84 (see also his "Musica nella tragedia greca," 58–61); and a reconstruction and full transcription is included in Thomas J. Mathiesen, "New Fragments of Ancient Greek Music," *Acta musicologica* 53 (1981): 14–32. The rhythmic character of the fragment is further pursued in idem, "Rhythm and Meter."

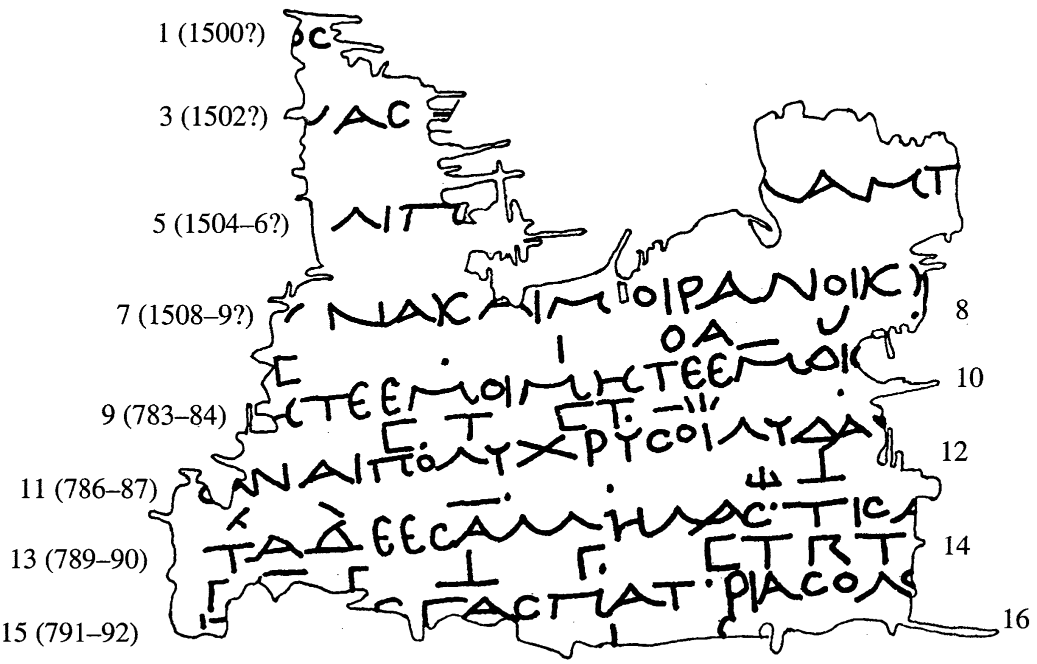
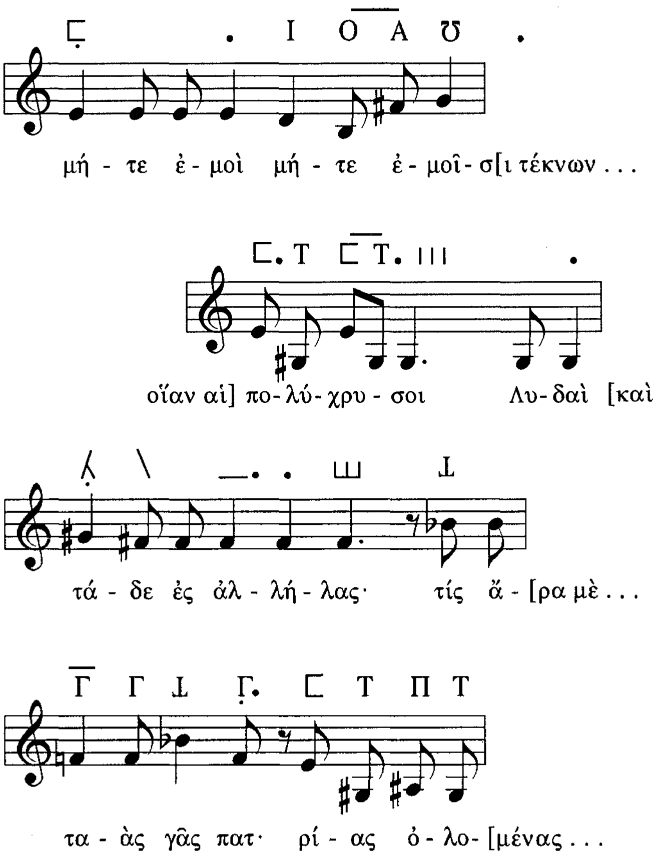


Figure 7.

The first seven lines correspond to lines 1500–1509 of the traditional editions, a section in which Iphigenia and the chorus alternate every few lines. Only one syllable of the choral sections appears at the top of the fragment, but most of line 1508, a solo section, is visible. No musical notation appears in these lines. In the traditional editions, an extended chorus follows on line 1510. In the papyrus fragment too, a chorus follows, but the chorus corresponds to lines 783–94 of the traditional editions. This section includes musical notation, and like the Delphic paeans, it exhibits reduplicated vowels, appearing not only within words but also across words where elision is avoided. The rhythm of the passage is choriambic (–⏑⏑–) and bacchic (⏑––), and the conscious avoidance of elision is made clear by the musical notation in the following transcription.[183]

---

[183] On the rhythms, see Aristides Quintilianus *De musica* 1.22 and 26. Cf. Hephaestion *Ench.* 9 (+ scholia). In the transcription, the bracketed text corresponds to the parts of the text restored from the manuscript tradition; small dots below a few of the musical notes indicate uncertain transcription of the symbol.


Ϲ . I O A Ʊ .
μή - τε ἐ - μοὶ μή - τε ἐ - μοῖ - σ[ι τέκνων . . .
Ɛ. T Ɛ T. III .
οἵαν αἱ] πο-λύ-χρυ - σοι Λυ-δαὶ [καὶ . . .
Λ \ —. . Ш Ʇ
τά - δε ἐς ἀλ - λή - λας· τίς ἅ - [ρα μὲ . . .
Γ Γ Ʇ Γ. Ɛ T Π T
τα - ᾶς γᾶς πατ· ρί - ας ὀ - λο- [μένας . . .

[184]

As was the case in the Delphic paeans, the musical notation elaborates the rhythm of a simple textual scansion. In the Delphic paeans, the musical rhythm simply resolved some of the long syllables in the text into two short notes in the music, but in this fragment the rhythmic notation provides additional lengthening of certain syllables. Thus, the music actually alters the textual rhythm.

♩ ♪ ♪ ♩ | ♩ ♪ ♪ ♩ | [♪ ♩ ♩	compared to	–◡◡–|–◡◡–|◡––
♩ ♪ ♩]♪ | ♪ ♫ ♩. | ♪ ♩ [♩		–◡–◡|–––|◡––
♩ ♪ ♪ ♩ | ♩ ♩. 𝄾 | ♪ ♪		–◡◡–|––:◡|–◡
♩ ♪ ♩ ♪ [𝄾 ?]| ♪ ♪ ♪ ♪ [♪ ♩		––– | ◡–◡◡◡–

---

[184] "[Never may there appear] to me or to my [children's children the prospect] that the wealthy Lydian women [and Phrygia's brides will have, as they converse] one with another [while standing at their looms:] who [will pluck me like a flower] from my perishing fatherland, [grasping my beautiful braided hair until my tears fall]?"

In the first line, two distinct notes and a diseme (—) are placed on the epsilons that form the last syllable of the third word and the first syllable of the fourth word, indicating that these two syllables together are equivalent to a long syllable and that each is sung to a different pitch. This makes it clear that the text is to be performed as μήτε ἐμοῖσι, a choriamb, and not with elision as μήτ' ἐμοῖσι, a cretic. Although the first two words are given only a single pitch, since they are fundamentally the same as the third and fourth words, it is reasonable to assume by analogy that they would have the same rhythmic value. In the second line, the second syllable in πολύχρουσοι is common,[185] and thus could be short or long. As the final syllable is marked with a triseme (ııı), which indicates that the note should be held for the value of three chronoi rather than the two normally assumed for a long syllable, the length of the metron must be maintained by taking the common syllable as short. In the third line, a diseme is once again placed following the epsilons that form the last syllable of the first word and the first syllable of the second word (τάδε ἐς), indicating as before that these two syllables together are equivalent to a long syllable and are not elided. Like the beginning of the first line, they are sung on a single pitch. Later in the third line, a pentaseme (ш) appears. This could be assumed to extend the final syllable of ἀλλήλας a full five chronoi, but such an extension would completely distort the consistent length of the choriambic pattern. It seems more likely that the pentaseme applies collectively to the second and third syllables of the word, producing a type of notated rallentando. If the punctuation mark is interpreted as a rest in which the singer might breathe,[186] the sixth chronos needed to complete the length equivalent to a choriamb is once again present. Finally, in the fourth line, a mysterious dot falls between the two syllables of πατ·ρίας. If it is taken as a rest, it would seem odd for a word to be broken by a rest. Moreover, if the rest were applied in the first metron, the metron would distort the choriambic pattern by containing seven chronoi; if it is applied in the second metron, the subsequent metra may need to be rearranged. Perhaps it is not a rest at all but merely serves to divide the mute τ from the liquid ρ in order to indicate clearly that the first syllable of πατρίας, which is common, is to be taken as short.

---

[185] Common syllables are defined by Aristides Quintilianus (*De musica* 1.21) as "sometimes short, sometimes long, they fulfill the need." Various rules are then provided for determining whether or not a syllable is common. In this case, the second syllable of πολύχρουσοι is common because the two letters following it are a mute and a liquid. See Mathiesen, "Rhythm and Meter," 163–65.

[186] Aristides Quintilianus, Augustine, and Quintilian all refer to the importance of rests in distinguishing rhythmic and metric patterns. See Mathiesen, "Rhythm and Meter," 168–69. .

While the dot appearing between the syllables of πατρίας is unusual, the musical fragments in general make considerable use of stigmai (στιγμαί), or dots within the lines of notation. The stigme is given only a very limited definition in the theoretical sources,[187] but its meaning is clear in this fragment: in each line, it marks off the first metron to define the rhythmic pattern and then marks the long syllable of the metra where the pattern changes. In the first and third lines of the transcription (p. 113), the initial stigme marks the end of the first choriamb (–⏑⏑–), while in the second and fourth lines, it marks the end of the first trochaic foot (–⏑–⏑). The second stigme in the first line marks the first long syllable of the ensuing bacchius (⏑––), although the text itself is not preserved; in the second and third lines, the second stigme marks the change in rhythmic pattern of the second foot (⏑––). Only the second line exhibits three stigmai, and here the third stigme falls on the long syllable of the bacchius, paralleling exactly its function in the previous line.

Modulation from one tonos to another has already been encountered in the Delphic paeans, where the shifts from Lydian to Hypolydian and Phrygian to Hypophrygian underscored major sections of the text. Here, by contrast, the tonoi are the more extreme Hyperaeolian and Hyperphrygian, and the modulation occurs on the poignant interrogative τίς (who?), which is also the highest note in the fragment (b♭'). The tonos returns to Hyperaeolian on the very next line, where the dot appears at the middle of πατ·ρίας. Is this coincidence, or is this dot perhaps intended to represent the point of modulation rather than a rest? If there were no rest, the choriambic pattern would not be distorted. The consistency of this pattern in each metron would seem to argue for such an interpretation. In any event, the suddenness of the modulations, their use to heighten the effect of individual passages of the text, and a melodic line ranging over a ninth (in conventional transcription, from b♭' to g♯) certainly accord with the characterizations of Euripides's style as complex, emotional, and intense.[188]

---

[187] Bellermann's Anonymous 3 (Najock 68.11–12).

The second fragment, *P.Wien* G2315, is once again a small scrap of papyrus, probably a few decades younger than *P.Leid.* Inv. 510. This scrap, which measures approximately 9 x 8.5 cm, comes from the center of a roll and records fourteen consecutive lines of text and musical notation from *Orestes* (338–44). As in the Leiden papyrus, the precise arrangement of the *Orestes* text differs somewhat from the traditional editions.[189] Unlike the Leiden papyrus, however, the text and notation of the *Orestes* papyrus are quite well preserved (figure 8).

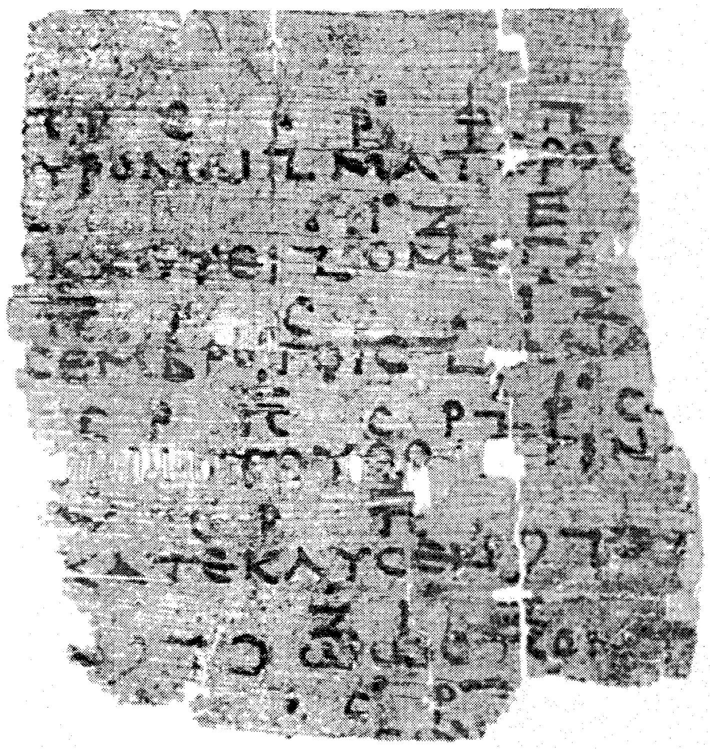


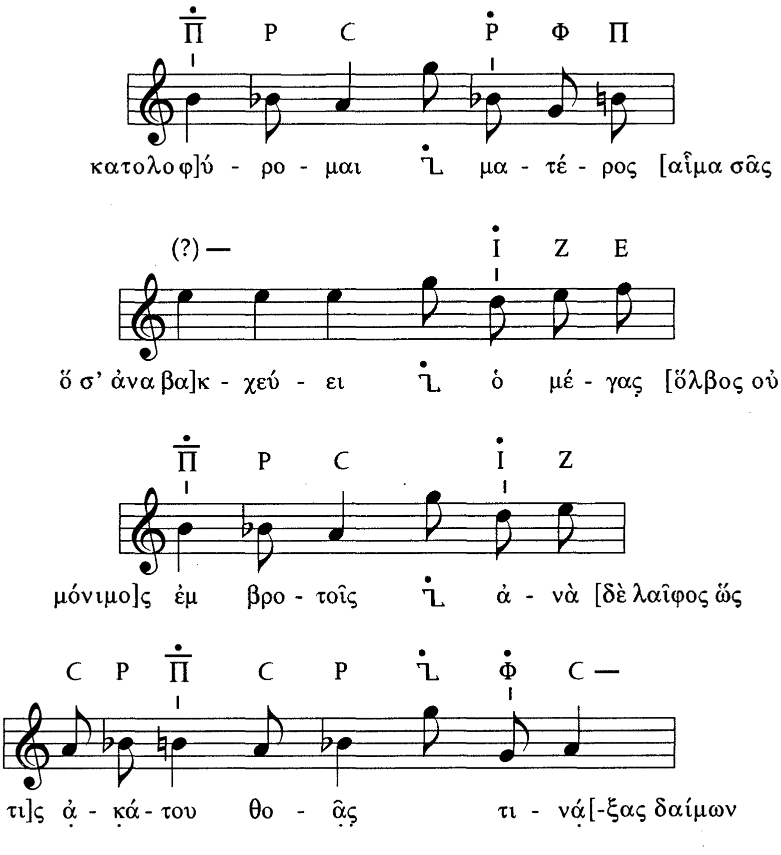
Figure 8.

---

[188] Whether this fragment actually represents the music Euripides composed 125 years earlier must remain an open question. See chapters 5–6 for a discussion of the tonoi.

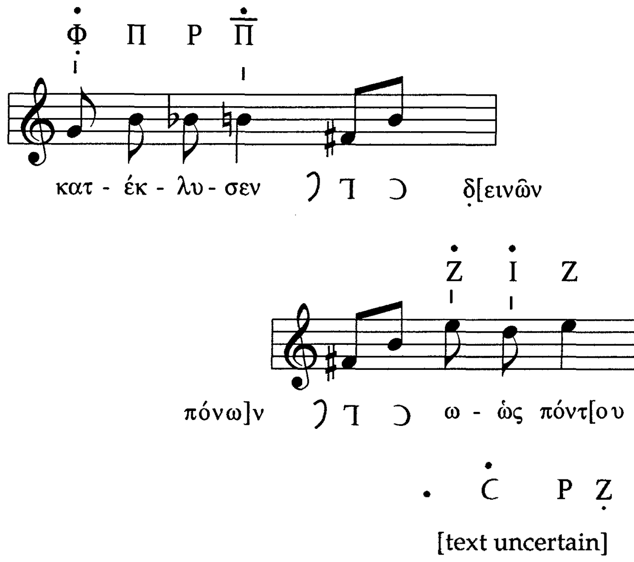
[189] The fragment, which is preserved in the Papyrus Collection of the Österreichische Nationalbibliothek, has been the subject of numerous studies since it first became known in 1890. In the Bibliography, see V. di Benedetto, W. Biehl, O. Crusius, A. M. Dale, I. Düring, D. Feaver, H. Hunger, Karl von Jan, W. J. W. Koster, G. A. Longman, E. Martin, D. B. Monro, J. F. Mountford, C. Préaux, Th. Reinach, K. Schlesinger, J. Solomon, O. Tiby, C. Torr, E. G. Turner, R. Wagner, C. Wessely, C. F. A. Williams, and R. P. Winnington-Ingram.

Reduplicated vowels appear only once in this fragment (ωὠς), but it exhibits the interesting and expressive dochmiac rhythm (⏑⏑⏑–⏑–),[190] instrumental interludes that complete the rhythmic pattern left incomplete in the text, and special marks between each dochmius that have been the subject of considerable speculation. As the text in this papyrus preserves the center of the lines rather than one or the other edge, the following transcription completes the left and right sides on the basis of the textual tradition.


Π P C Ṗ Φ Π
κατολοφ]ύ - ρο - μαι ˥ μα - τέ - ρος [αἷμα σᾶς
(?) — İ Z E
ὅ σ' ἀνα βα]κ - χεύ - ει ˥ ὁ μέ - γας [ὄλβος οὐ
Π P C İ Z
μόνιμο]ς ἐμ βρο - τοῖς ˥ ἀ - νὰ [δὲ λαῖφος ὥς
C P Π C P ˥ Φ C —
τι]ς ἀ - κά - του θο - ᾶς τι - νά[-ξας δαίμων

---

[190] See Aristides Quintilianus *De musica* 1.17, where the dochmius is described as constructed of an iamb and a paeon diaguios. A second dochmiac is also described, consisting of an iamb, a dactyl, and a paeon. Cf. Bacchius *Introductio artis musicae* 99–101 and Hephaestion *Ench.* 10 (+ scholia).



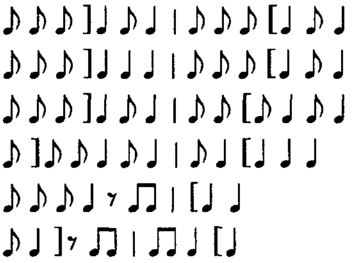
In this fragment, it is clear that the presence or absence of disemes clarifies the value of the dichronic syllables in every line of the text; of common syllables, such as ἐμ in line 3; of doubled syllables, such as ωὡς in line 6; and of syllables followed by a double consonant, as in τινάξας in line 4, where the singer might fail to recognize the second syllable as long by position.[191] The only anomaly is the diseme over the diphthong in line 4, which should surely be recognized as long by nature. Nevertheless, since the notator has placed a diseme over the corresponding syllable in every other line, he may have repeated it here simply as a precaution.

Lines 5 and 6 provide particularly interesting examples of the use of instrumental notes within a choral passage. In each line, the first of these notes is a diastole, which "indicates a pause and divides that which precedes from that which follows,"[192] while the two following symbols are actual instrumental notes, f♯' and b'. As it happens, this passage (line 343) in the textual tradition has always seemed problematic in rhythmic terms. But if the instrumental notes and the diseme that appears over the last syllable of κατέκλυσεν were considered, the metron would be expanded to at least ⏑⏑⏑–⏑⏑; it is more probable, however, that the diastole would equal a chronos, thereby producing the value of a complete dochmius. The sixth line is less clear. If the same value is assumed for the same instrumental series, the first metron would then be equivalent to six chronoi. Two separate notes are placed over the two omegas of ωῶς, and from the analogy of the Delphic paeans, it would be reasonable to assume that these two together would equal a single long syllable. If they occupied the second metron of this line, both metra would contain six chronoi rather than the eight expected in a dochmiac foot. No perfectly consistent solution presents itself, but if the musical notation is taken as the measure of the rhythm of the passage, it seems that the music once again modifes and—in this case—expands the textual rhythm.

---

[191] Dichronic syllables are those containing one of the three Greek vowels (alpha, iota, and upsilon) that can be either short or long (Aristides Quintilianus *De musica* 1.20); on common syllables, see n. 185 *supra;* a syllable becomes "long by position" when the vowel is followed by two semivowels or a double consonant (with some exceptions involving mutes and liquids), whether or not these are in the same syllable or even in the same word. See Mathiesen, "Rhythm and Meter," 163–65.

[192] The diastole is described in identical terms in Bellermann's Anonymous 11 (Najock 72.13–16) and in Manuel Bryennius *Harmonica* 3.4 (*ΜΑΝΟΥΗΛ ΒΡΥΕΝΝΙΟΥ ΑΡΜΟΝΙΚΑ, The Harmonics of Manuel Bryennius,* ed. and trans. G. H. Jonker [Groningen: Wolters-Noordhoff, 1970], 312.15–16): Ἡ δὲ διαστολὴ ἐπί τε



compared to

⏑⏑⏑–⏑–|⏑⏑⏑–⏑–
⏑⏑⏑–––|⏑⏑⏑–⏑–
⏑⏑⏑–⏑–|⏑⏑⏑–⏑–
⏑⏑⏑–⏑–|⏑––––
⏑⏑⏑⏑|––
⏑–|–––

There is, of course, still the matter of the symbol that falls between the dochmii in lines 1–4. Some traces at the bottom of the papyrus suggest that this symbol returns in line 7, where the length of the metron is again eight chronoi. The symbols would thus seem to be intended to articulate the dochmiac patterns, and since they fall on the text line, as do the instrumental notes introduced by the diastole, it may be reasonable to consider them as indications of an instrumental flourish, perhaps the mesaulion described in Psellus's *De tragoedia*.

Like the *Iphigenia* fragment, the *Orestes* fragment too exhibits a regular pattern of stigmai. With the exception of the first note in

---

τῶν ᾠδῶν καὶ τῆς κρουματογραφίας παραλαμβάνεται ἀναπαύουσα καὶ χωρίζουσα τὰ προάγοντα ἀπὸ τῶν ἐπιφερομένων. Bellermann's Anonymous, however, adds: ἑξῆς. ἐστὶ δὲ αὐτῆς σχῆμα ⟨καὶ⟩ σημεῖον τόδε **7**.

line 2 of the papyrus, which is missing, the initial note of each half of the dochmius is marked with a stigme, as can be inferred from the presence of the second half of each dochmius on the left side of the papyrus and the first half of the following dochmius on the right side. Only the two notes over the repeated vowel in line 6 depart from the pattern, but since these collectively sound the first syllable, it does not seem improper for both of them to have been marked with a stigme. A stigme also appears over each of the symbols separating the dochmii in lines 1–4. Inasmuch as the dochmius is defined as composed of two parts, an iamb (⏑– or ⏑⏑⏑) and a paeon diaguios (–⏑–),[193] it would seem that the stigmai are intended to mark off the beginning of each rhythmic part, as well as the articulation provided by the instrumental injection.

There are no modulations in the *Orestes* fragment, and the notation clearly indicates the enharmonic or chromatic Lydian tonos. The melody is not nearly as disjunct as that of the *Iphigenia* fragment. Nevertheless, the melodic design of these few lines makes considerable use of chromatic movement, effectively suiting the anguish of the chorus at this point in the tragedy; Psellus and Plutarch credit Euripides and Agathon with the introduction of the chromatic genus into tragedy, and the *Orestes* fragment not only accords with this specific observation but also with the general observations about the complexity of Euripides's style.[194]

It is once again apparent that the musical notation is essential to a complete understanding of the rhythmic and metric shape of choral lyric, not to mention its role in heightening and shaping the emotion of the text. Standing alone, the text alone is insufficient and may in fact provide a misleading sense of the rhythmic pattern intended by the composer.

Since both papyrus fragments are of a later date than the first productions of Euripides's plays, the question properly arises whether they represent the actual music employed by Euripides; music in the style of Euripides, if not the actual music; or a later style, distant from the original style. No definitive answer is possible in the absence of additional evidence from the fifth century B.C.E. Nevertheless, there is sufficient evidence to indicate that particular features of the style represented by the papyrus fragments—especially alteration of the textual rhythm, reduplication of syllables, and chromatic or disjunct musical lines—were characteristic of Euripides's music. Dionysius of Halicarnassus, for example, provides an extraordinary discussion of the close connection between music and language in the eleventh chapter of his treatise *De compositione verborum*. He begins with some general observations about the aims of "all serious writers of meter, melos, and prose"[195] and then turns his attention to the specific power of music in realizing these aims. He remarks that the text is subservient to the music and introduces an example from Euripides's *Orestes* as proof:

---

[193] Aristides Quintilianus *De musica* 1.17.

[194] The innovative qualities of Euripides's music are discussed in Lukas Richter, "Die Musik der griechischen Tragödie und ihre Wandlungen unter veränderten historischen Bedingungen," in *Die griechische Tragödie in ihrer gesellschaftlichen Funktion*, ed. Heinrich Kuch, Veröffentlichungen des Zentralinstituts für alte Geschichte und Archäologie der Akademie der Wissenschaften der DDR, vol. 11 (Berlin: Akademie-Verlag, 1983), 115–39.

σῖγα σῖγα, λευκὸν ἴχνος ἀρβύλης
τίθετε, μὴ κτυπεῖτ'·
ἀποπρόβατ' ἐκεῖσ', ἀποπρό μοι κοίτας.

> In these lines, σῖγα σῖγα λευκόν is sung to one note; and yet each of the three words has both low pitch and high pitch. And ἀρβύλης has its third syllable at the same pitch as its middle syllable, although it is impractical for one word to have two acute accents. The first syllable of τίθετε is lower, while the two that follow are sung as oxytones and homophones. The circumflex of κτυπεῖτε has disappeared, for the two syllables are uttered on one pitch. And ἀποπρόβατε does not follow its acute prosody on the middle syllable, but the pitch of the third syllable has been shunted to the fourth. It is the same with regard to the rhythms. Prose diction never violates or alters the chronoi in any noun or verb, but maintains the syllables, both long and short, as it has received them by nature. But music and rhythmics change them by shortening and lengthening, so that they often pass into their opposites: the chronoi are not regulated by the syllables, but the syllables by the chronoi.[196]

---

[195] πάντες οἱ σπουδῇ γράφοντες μέτρον ἢ μέλος ἢ τὴν λεγομένην πεζὴν λέξιν (Roberts 120.26–27).

[196] ἐν γὰρ δὴ τούτοις τὸ "σῖγα σῖγα λευκὸν" ἐφ' ἑνὸς φθόγγου μελῳδεῖται, καίτοι τῶν τριῶν λέξεων ἑκάστη βαρείας τε τάσεις ἔχει καὶ ὀξείας. καὶ τὸ "ἀρβύλης" τῇ μέσῃ συλλαβῇ τὴν τρίτην ὁμότονον ἔχει, ἀμηχάνου ὄντος ἓν ὄνομα δύο λαβεῖν ὀξείας. καὶ τοῦ "τίθετε" βαρυτέρα μὲν ἡ πρώτη γίνεται, δύο δ' αἱ μετ' αὐτὴν ὀξύτονοί τε καὶ ὁμόφωνοι. τοῦ τε "κτυπεῖτε" ὁ περισπασμὸς ἠφάνισται· μιᾷ γὰρ αἱ δύο συλλαβαὶ λέγονται τάσει. καὶ τὸ "ἀποπρόβατε" οὐ λαμβάνει τὴν τῆς μέσης συλλαβῆς προσῳδίαν ὀξεῖαν, ἀλλ' ἐπὶ τὴν τετάρτην συλλαβὴν μεταβέβηκεν ἡ τάσις ἡ τῆς τρίτης. τὸ δ' αὐτὸ γίνεται καὶ περὶ τοὺς ῥυθμούς. ἡ μὲν γὰρ πεζὴ λέξις οὐδενὸς οὔτε ὀνόματος οὔτε ῥήματος βιάζεται τοὺς χρόνους οὐδὲ μετατίθησιν, ἀλλ' οἵας παρείληφεν τῇ φύσει τὰς συλλαβὰς τάς τε μακρὰς καὶ τὰς βραχείας, τοι-

Modification (or, perhaps better, elaboration) of the textual rhythm by the music is certainly a clear feature of the papyrus fragments, as is a general disregard for matching the melodic contour to the natural pitch contour of the text. Moreover, it should surely not be regarded as coincidence that the example chosen by Dionysius comes from *Orestes*. In one sense, it is unfortunate that Dionysius did not discuss the passage represented in the papyrus, but Dionysius's description taken together with the evidence of the papyrus is strong indication that the characteristics of the papyrus are not atypical.

Dionysius was writing at the end of the first century B.C.E. and the beginning of the first century C.E., while the papyri date from the third century B.C.E. If the style represented in the papyri could have survived long enough for Dionysius to describe it—that is, for at least two centuries—, it is not unreasonable to conjecture that the style of Euripides's music could have survived from the end of the fifth century to the mid-third century B.C.E.

Euripides's style was, of course, not known only to Dionysius of Halicarnassus. It is also the subject of parody in Aristophanes's *Ranae*, produced at the Lenaian festival[197] of 405 B.C.E., only a few months after the death of Euripides and just before the performance of *Iphigenia Aulidensis* at the Dionysia. *Ranae* appeared near the end of the Peloponnesian War (431–404 B.C.E.) when Athens was exhausted and demoralized. The great poets Aeschylus, Sophocles, and Euripides have died, and at the beginning of the comedy, Dionysus, disguised as Heracles, journeys to Hades to bring back Euripides, the favorite of the Athenians. Dionysus is asked to judge a contest between Aeschylus and Euripides for possession of the throne of tragedy, which Sophocles has already con-

---

αὐτας φυλάττει· ἡ δὲ μουσική τε καὶ ῥυθμικὴ μεταβάλλουσιν αὐτὰς μειοῦσαι καὶ παραύξουσαι, ὥστε πολλάκις εἰς τἀναντία μεταχωρεῖν· οὐ γὰρ ταῖς συλλαβαῖς ἀπευθύνουσι τοὺς χρόνους, ἀλλὰ τοῖς χρόνοις τὰς συλλαβάς (Roberts 128.4–130.2). The passage is from *Orestes* 140–42: "Hush, hush, light be the tread of the boot; let there be no echo. Step far away, far away from his bed." According to Dionysius, this passage is delivered by Elektra to the chorus. In the manuscript tradition, however, the wording of this passage is somewhat different: σῖγα σῖγα, λεπτὸν ἴχνος ἀρβύλης | τίθετε, μὴ ψοφεῖτε, μὴ 'στω κτύπος, | ἀποπρὸ βᾶτ' ἐκεῖσ', ἀποπρό μοι κοίτας; and the first two lines are assigned to the chorus, while only the last is assigned to Elektra.

[197] The Lenaia was a festival in honor of Dionysus Lenaios celebrated in Athens on the twelfth day of the month of Gamelion (i.e., January–February). On this festival, see Pickard-Cambridge, *Dramatic Festivals*, 25–42.

ceded in favor of Aeschylus. While agreeing that it is their duty to improve mankind, Aeschylus and Euripides criticize each other's language, meter, and music, as well as the general character of the plays. Aeschylus claims his plays are grand and moral, based on heroic figures; Euripides claims the realism and humanity of his plays make the audience think. The contest is won by Aeschylus when he and Euripides speak a series of lines into a scale in order to determine which are the more substantial. Still undecided, Dionysus asks the poets how Athens might be saved, and Euripides responds in a characteristically complex and obscure manner. Dionysus then decides to return to Athens with Aeschylus, who in turn consigns his throne to Sophocles, as the chorus concludes:

> First, as the poet triumphant is passing away to the light,
> Grant him success on his journey, ye powers that are ruling below.
> Grant that he find for the city good counsels to guide her aright;
> So we at last shall be freed from the anguish, the fear, and the woe,
> Freed from the onsets of war. Let Cleophon now and his band
> Battle, if battle they must, far away in their own fatherland.[198]

In lines 1285–95, Euripides parodies Aeschylus's use of refrains and the monotony of his hexameter rhythm by introducing the nonsensical phrase τὸ φλαττοθραττοφλαττόθρατ, an onomatopoetic imitation of the strumming of the lyre.[199] Dionysus asks Aeschylus about the origin of this lyre-strumming, and Aeschylus responds by contrasting his style—derived from the noble source of Homer—to that of Euripides:

> From noblest source for noblest ends I brought them, unwilling in the Muses' holy field the self-same flowers as Phrynichus to cull. But he [Euripides] draws his melos from harlot-songs, from Carian aulos-music, skolia of Meletus, dirges, dance music. You shall hear directly. Bring me the lyre. Yet wherefore need a lyre for songs like these? Where's she that bangs her castanets? Euripides's Muse, present yourself. Such a Muse is fit to sing such mele.[200]

---

[198] Lines 1528–33: πρῶτα μὲν εὐοδίαν ἀγαθὴν ἀπιόντι ποιητῇ | ἐς φάος ὀρνυμένῳ δότε, δαίμονες οἱ κατὰ γαίας, | τῇ τε πόλει μεγάλων ἀγαθῶν ἀγαθὰς ἐπινοίας. | πάγχυ γὰρ ἐκ μεγάλων ἀχέων παυσαίμεθ' ἂν οὕτως | ἀργαλέων τ' ἐν ὅπλοις ξυνόδων. Κλεοφῶν δὲ μεχέσθω | κἄλλος ὁ βουλόμενος τούτων πατρίοις ἐν ἀρούραις. *Aristophanes*, 3 vols., trans. Benjamin Bickley Rogers, Loeb Classical Library (Cambridge: Harvard University Press, 1924), 437.

[199] Cf. a similar use of onomatopoeia in the hyporcheme of Pratinas (p. 93 *supra*).

[200] Lines 1298–1307: ἀλλ' οὖν ἐγὼ μὲν ἐς τὸ καλὸν ἐκ τοῦ καλοῦ | ἤνεγκον αὔθ', ἵνα μὴ τὸν αὐτὸν Φρυνίχῳ | λειμῶνα Μουσῶν ἱερὸν ὀφθείην δρέπων· | οὗτος δ'

It is now Aeschylus's turn to parody Euripides's musical style (lines 1298–1363), which he likens to the twelve tricks of the courtesan Cyrene. In these parodies, Aeschylus makes use of repetition of text (ἐμοὶ δ' ἄχε' ἄχεα κατέλιπε, δάκρυα δάκρυά τ' ἀπ' ὀμμάτων ἔβαλον ἔβαλον ἁ τλάμων) cleverly reminiscent of the repetition at *Orestes* 140 (σῖγα σῖγα) quoted by Dionysius of Halicarnassus or *Orestes* 339 (κατολοφύρομαι κατολοφύρομαι) found in the *Orestes* papyrus; and anticipating *Iphigenia Aulidensis* 783 (μήτε ἐμοὶ μήτε ἐμοῖσι τέκνων τέκνοις), as found in the *Iphigenia* papyrus. In addition, Euripides's practice of setting multiple notes to a single syllable by reduplicating vowels, which appeared in both of the papyrus fragments, is parodied by Aeschylus in his amusing six-fold reduplication in the description of the "twirling" (εἱειειειειειλίσσετε and εἱειειειειειλίσσουσα) fingers of a venomous spider or a spinning-girl (1314 and 1348). Aristophanes most probably accompanied these reduplicated syllables with a chromatic melisma.[201]

The contemporary evidence of Aristophanes, considered together with the testimony of Dionysius of Halicarnassus, speaks strongly in support of the papyrus fragments representing music that is close to the style of Euripides. There is, in fact, little to argue against it even being the original music for these tragedies.[202]

ἀπὸ πάντων μελοφορεῖ πορνῳδικῶν, | σκολίων Μελήτου, Καρικῶν αὐλημάτων, | θρήνων, χορειῶν. τάχα δὲ δηλωθήσεται. | ἐνεγκάτω τις τὸ λύριον. καίτοι τί δεῖ | λύρας ἐπὶ τοῦτον; ποῦ 'στιν ἡ τοῖς ὀστράκοις | αὕτη κροτοῦσα; δεῦρο Μοῦσ' Εὐριπίδου, | πρὸς ἥνπερ ἐπιτήδεια τάδ' ἔστ' ᾄδειν μέλη.

[201] Like their Greek counterparts, modern European artists regarded the theatre as a particularly powerful vehicle for social, political, and aesthetic comment. Aristophanes's sophisticated musical satire, albeit in a very different style, foreshadows operatic works like W. A. Mozart's *Der Schauspieldirektor* or Jacques Offenbach's *Les Contes d'Hoffmann*. In the theatre, a similar sort of parody of dramatic style appears in Richard Brinsley Sheridan's *The Critic; or, A Tragedy Rehearsed*.

[202] Anderson (*Music and Musicians*, 220–22) argues that the music of the *Orestes* papyrus cannot represent Euripides's music because "insurmountable difficulties bar the way. Chief among them is the absence of any evidence that Hellenic Greeks had a written system of musical notation in general use." Aristoxenus, however, makes specific reference to musical notation, which he associates with the Harmonicists while dismissing it as irrelevant to the proper study of harmonics (see p. 323 *infra*). It is not, of course, impossible that musical notation could have developed and been adopted by the Harmonicists in the brief period between the time of Euripides and Aristoxenus, but it seems at least as reasonable to assume a somewhat more venerable heritage. Anderson further suggests that issues of professionalism and the nature of audiences and the drama itself argue

In the drama, Greek music found its fullest and most powerful expression. As the center of significant civic and religious festivals, the drama provided poets, citizen or professional choruses, and actors the opportunity to create extended musical structures on important themes, while at the same time providing an occasion for a substantial portion of the populace[203] to gather as a social unit and concentrate on the dynamic combination of text, music, instrumental accompaniment, dance, gesture, and costume governed by a structure sufficiently strict to be coherent but flexible enough to allow for the divergence of expression represented by Aeschylus, Sophocles, and Euripides.[204]

Music for the Mortals

While music formed an essential part of civic and religious festivals, it also was indispensable in everyday life. Proclus's *Chrestomathia* specifies nine types of melic poetry allotted to humankind: encomia, the epinikion, skolia, erotica, epithalamia, hymenaioi, silloi, threnodies, and epikedeia, as well as other types of special work songs.[205] Aristides Quintilianus devotes the entire second book of his *De musica* to a discussion of the educational—or, paideutic—role of music. After noting some of its particular uses, he observes that music springs naturally from the widest range of human emotions and circumstances:

> Indeed, the ancients saw that we do not turn to singing for a single reason, rather some sing in contentment accompanying pleasure, others in vexation accompanying pain, and still others sing occupied by divine impulse and inspiration accompanying divine suffusion; or even when these are mixed one with another by certain chances and circumstances; or when children,

---

against the "wishful thought that time and chance have placed in our hands the music making of Euripides." There is clearly room for difference of opinion on this matter.

[203] On the character and composition of the audience, see Pickard-Cambridge, *Dramatic Festivals*, 263–78.

[204] For an interesting study of the way in which the Greek traditions were adopted and adapted in the Roman theatre, see Bruno Gentili, *Theatrical Performances in the Ancient World: Hellenistic and Early Roman Theatre*, London Studies in Classical Philology, vol. 2 (Amsterdam: J. C. Gieben, 1979).

[205] See p. 28 *supra*.

> because of their age, or even those advanced in age, because of weakness of nature, are led on by such passions.[206]

Although he proceeds to question its power, Sextus Empiricus takes due note of the pervasive use of music:

> In general, music is heard not only from people who are rejoicing, but also in hymns, feasts, and sacrifices to the gods. Because of this, it turns the heart toward the desire for good things. But it is also a consolation to those who are grief-stricken; for this reason, the auloi playing a melody for those who are mourning are the lighteners of their grief.[207]

Distinctions among the types of music used in everyday life rely more heavily on the subject of the text and the particular occasion than on large-scale poetic structures or conventions in performance, as was the case for at least some of the distinctions drawn among the civic and festal types. Moreover, it seems apparent that improvisation and spontaneous musical expression played a large part in the music of daily life. Although some texts do survive for this music, the literary and iconographic evidence is particularly important for the record it provides of musical education, music-making at the symposia, music as a private amusement, and so on.

Hymenaios and epithalamion

Proclus's *Chrestomathia* classes the hymenaios (ὑμέναιος) and epithalamion (ἐπιθαλάμιον) in the general category of love songs (ἐρωτικά) because they "sing of the circumstances of love of women, boys, and maidens." The hymenaios was sung at the wedding itself, while the epithalamion was sung to the newlyweds (ἄρτι θαλαμευόμενοι) by a group of young unmarried men and maidens at the door of the wedding chamber. Proclus recalls two traditional explanations for the singing of the hymenaios: either in commemoration of the yearning and searching for Hymenaios, the son of Terpsichore, who becomes invisible after marriage; or in honor of the Attic Hymenaios, who once pursued a group of pirates to rescue the Attic maidens they had abducted. Photius, however, prefers a more complex etymology: the term is derived from Aeolic dialect, where ὑμεναίειν is equivalent to ὁμονοεῖν, which means "to live together in harmony." A Hymenaios is therefore a prayer for a prosperous life and a marriage of tender affection.[208]

---

[206] καὶ μὴν οὐκ ἀπὸ μιᾶς ἡμᾶς αἰτίας ἑώρων εἰς τὸ μελῳδεῖν τρεπομένους ἀλλὰ τοὺς μὲν ἐν εὐθυμίαις ὑφ' ἡδονῆς, τοὺς δ' ἐν ἀχθηδόσιν ὑπὸ λύπης, τοὺς δὲ ὑπὸ θείας ὁρμῆς καὶ ἐπιπνοίας κατεχομένους ὑπὸ ἐνθουσιασμοῦ, ἢ καὶ τούτων μιγνυμένων πρὸς ἄλληλα κατά τινας συντυχίας τε καὶ περιστάσεις, ἤτοι παίδων διὰ τὴν ἡλικίαν τοῖς τοιούτοις πάθεσιν ἢ καὶ τῶν προβεβηκότων δι' ἀσθένειαν φύσεως ὑπαγομένων (W.-I. 57.31–58.5). Mathiesen, *AQ on Music,* 120.

[207] καθόλου γὰρ οὐ μόνον χαιρόντων ἐστὶν ἄκουσμα, ἀλλ' ἐν ὕμνοις καὶ εὐωχίαις καὶ θεῶν θυσίαις ἡ μουσική· διὰ δὲ τοῦτο καὶ ἐπὶ τὸν τῶν ἀγαθῶν ζῆλον τὴν διάνοιαν προτρέπεται. ἀλλὰ καὶ λυπουμένων παρηγόρημα· ὅθεν καὶ τοῖς πενθοῦσιν αὐλοὶ μελῳδοῦσιν οἱ τὴν λύπην αὐτῶν ἐπικουφίζοντες (Greaves 140–41).

In the *Iliad*, the "Shield of Achilles" vividly pictures a wedding celebration, including a hymenaios and various musical instruments:

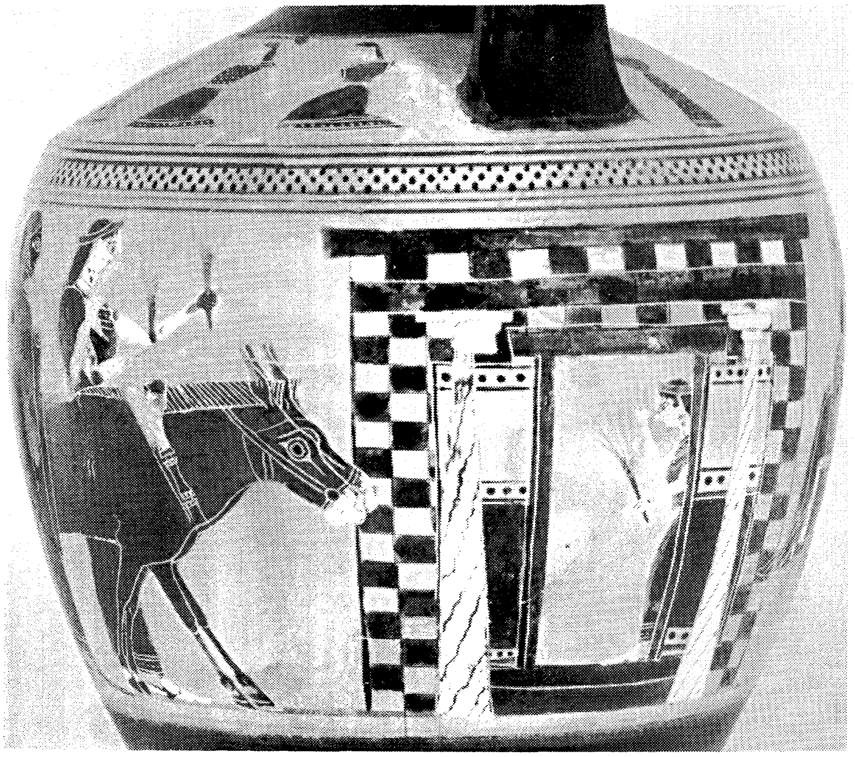
> On it he wrought in all their beauty two cities of mortal men. And there were marriages in one, and festivals. They were leading the brides along the city from their maiden chambers under the flaring of torches, and the loud hymenaios was arising. The young men followed the circles of the dance, and among them the auloi and the phorminxes kept up their clamor as in the meantime the women standing each at the door of her court admired them.[209]

A black-figure lekythos of the Amasis Painter (ca. 560–525 B.C.E.) provides an illustration of a bridal procession. The newly-weds are arriving at home, their way lighted by torches held by one of the handmaidens. On the shoulder of the lekythos, a chorus of maidens is dancing, accompanied by a lyre on one side and auloi on the other. Inasmuch as the wedding party is arriving at the doorway of the house, the maidens are perhaps intended to be singing an epithalamion.[210]

---

[208] τὰ δὲ ἐρωτικὰ δῆλον ὅτι γυναικῶν καὶ παίδων καὶ παρθένων ἐρωτικὰς ᾄδει περιστάσεις. καὶ τὰ ἐπιθαλάμια δὲ τοῖς ἄρτι θαλαμευομένοις ἅμα οἱ ἠΐθεοι καὶ αἱ παρθένοι ἐπὶ τῶν θαλάμων ᾖδον. ὑμέναιον δὲ ἐν γάμοις ᾄδεσθαί φασι κατὰ πόθον καὶ ζήτησιν Ὑμεναίου τοῦ Τερψιχόρας, ὅν φασι γήμαντα ἀφανῆ γενέσθαι, οἱ δὲ κατὰ τιμὴν τοῦ Ἀττικοῦ Ὑμεναίου· τοῦτον γάρ φησί ποτε διώξαντα ἀφελέσθαι κούρας Ἀττικὰς λῃστῶν. ἐγὼ δὲ οἶμαι βίου τινὰ εὐτυχοῦς προαναφώνησιν ὑπάρχειν, καὶ συνεύχεσθαι τοῖς συνιοῦσι πρὸς γάμου κοινωνίαν μετὰ φιλοστοργίας, Αἰολικῇ παραπλέκοντας τὴν εὐχὴν διαλέκτῳ, οἷον ὑμεναίειν καὶ ὁμονοεῖν τούτους ἀεὶ ὁμόσε ναίοντας (Bekker 321a15–28). Cf. *Etymologicon magnum*, s.v. ὑμέναιος (776.41–49); and Athenaeus *Deipnosophistae* 14.10 (619b). On these two types in general, see R. Muth, "Hymenaios und Epithalamion," *Wiener Studien* 67 (1954): 5–45.

[209] *Ilias* 18.490–96: ἐν δὲ δύω ποίησε πόλεις μερόπων ἀνθρώπων | καλάς. ἐν τῇ μέν ῥα γάμοι τ' ἔσαν εἰλαπίναι τε, | νύμφας δ' ἐκ θαλάμων δαΐδων ὕπο λαμπομενάων | ἠγίνεον ἀνὰ ἄστυ, πολὺς δ' ὑμέναιος ὀρώρει. | κοῦροι δ' ὀρχηστῆρες ἐδίνεον, ἐν δ' ἄρα τοῖσιν | αὐλοὶ φόρμιγγές τε βοὴν ἔχον· αἱ δὲ γυναῖκες | ἱστάμεναι θαύμαζον ἐπὶ προθύροισιν ἑκάστη. Translation adapted from Lattimore, *Iliad*, 388.



New York, Metropolitan Museum of Art, Purchase,
Walter C. Baker Gift, 1956 (56.11.1)
All Rights Reserved, the Metropolitan Museum of Art

Figure 9.

A similar description appears in the *Scutum Herculis*, written in imitation of the "Shield of Achilles":

> The men were making merry with choruses and dance; some were bringing home a bride to her husband on a well-wheeled car, while the loud hymenaios was arising and the glow of blazing torches held by handmaidens rolled in waves afar. And these maidens went before, delighting in the festival; and after them came frolicsome choirs, the youths singing soft-mouthed to the sound of shrill syrinxes, while the echo was shivered around them, and the girls led on the lovely chorus to the sound of phorminxes. Then on the other side was a rout of young men revelling to the sound of the aulos, some frolicking with dance and song, and others going forward in time with the aulete and laughing. The whole town was filled with mirth and choruses and festivity.[211]

---

[210] New York, Metropolitan Museum of Art, Purchase, Walter C. Baker Gift, 1956 (56.11.1).

[211] Lines 272–85: τοὶ δ' ἄνδρες ἐν ἀγλαΐῃς τε χοροῖς τε | τέρψιν ἔχον· τοὶ μὲν γὰρ ἐυσσώτρου ἐπ' ἀπήνης | ἤγοντ' ἀνδρὶ γυναῖκα, πολὺς δ' ὑμέναιος ὀρώει· | τῆλε δ' ἀπ' αἰθομένων δαΐδων σέλας εἰλύφαζε | χερσίν ἔνι δμῳῶν· ταὶ δ' ἀγλαΐῃ

Like the paean with its refrain "Ie Paean," the hymenaios is characterized by the presence of a refrain and was certainly strophic. The exact form of the refrain varies; it is often "Hymen, Hymenaie" but in any case always includes some form of the name. Hephaestion provides an example from a hymenaios of Sappho (b. ca. 612 B.C.E.) as part of his description of refrains that occur within rather than at the ends of stanzas:

> On high the roof–Hymenaeus!–raise up, you carpenters–Hymenaeus! The bridegroom is coming, the equal of Ares, much larger than a large man.[212]

Hymenaioi sometimes appear in drama for tragic or comic effect. In Euripides's *Troades* (307–40), Cassandra incorporates the typical refrain of a hymenaios into her monody, but this may be intended to convey a sense of despair rather than the precise form and content of a hymenaios. In *Iphigenia Aulidensis,* the chorus (1036–97) refers to the hymenaios, but the absence of a refrain suggests that the chorus is describing a hymenaios rather than singing one. Moreover, the dramatic effect is tragic because the audience knows there will be no wedding. Both of these are strophic, the latter with an epode. The beginning of Cassandra's mad hymenaios illustrates the use of a typical refrain:

> Bring the light, uplift and show its flame! I am doing the god's service, see! see! making his shrine to glow with tapers bright. Hymen, O Hymenaios Lord! Blest is the bridegroom; blest am I also, the maiden soon to wed a princely lord in Argos. Hymen, O Hymenaios Lord![213]

τεθαλυῖαι | πρόσθ' ἔκιον· τῇσιν δὲ χοροὶ παίζοντες ἕποντο. | τοὶ μὲν ὑπὸ λιγυρῶν συρίγγων ἵεσαν αὐδὴν | ἐξ ἁπαλῶν στομάτων, περὶ δέ σφισιν ἄγνυτο ἠχώ. | αἳ δ' ὑπὸ φορμίγγων ἄναγον χορὸν ἱμερόεντα. | ἔνθεν δ' αὖθ' ἑτέρωθε νέοι κώμαζον ὑπ' αὐλοῦ, | τοί γε μὲν αὖ παίζοντες ὑπ' ὀρχηθμῷ καὶ ἀοιδῇ | τοί γε μὲν αὖ γελόωντες ὑπ' αὐλητῆρι ἕκαστος | πρόσθ' ἔκιον· πᾶσαν δὲ πόλιν θαλίαι τε χοροί τε | ἀγλαΐαι τ' εἶχον. ... Translation adapted from Evelyn-White, *Hesiod,* 239 and 241. The poem was once attributed to Hesiod, but it is apparently of a somewhat later date.

[212] ἴψοι δὴ τὸ μέλαθρον, | ὑμήναον, | ἀέρρετε, τέκτονες ἄνδρες· | ὑμήναον. | γαμβρὸς † (εἰσ)έρχεται ἶσος † Ἄρευι, ἄνδρος μεγάλω πόλυ μέσδων (text and translation from *Greek Lyric,* 1:136–37). Cf. Hephaestion *Poem.* 7 (Consbruch 70). Sappho fr. 44, which describes the return of Hector and Andromache from Thebes to the sound of auloi, krotala, and maiden choruses, may be a wedding-song, but it is not certain (see *Greek Lyric,* 1:88–91).

[213] *Troades* 307–14: ἄνεχε, πάρεχε, φῶς φέρε· σέβω, φλέγω, | ἰδοὺ ἰδού, | λαμπάσι τόδ' ἱερόν. | Ὑμήν, ὦ Ὑμέναι' ἄναξ, | μακάριος ὁ γαμέτας, | μακαρία δ' ἐγὼ βασιλικοῖς λέκτροις | κατ' Ἄργος ἁ γαμουμένα. | Ὑμήν, ὦ Ὑμέναι' ἄναξ (translation adapted from Edward P. Coleridge in *Aeschylus, Sophocles, Euripides,*

Although the two examples from Euripides are relatively short, a fuller example appears in Aristophanes's *Pax*, which concludes (1329–57) with an elaborate antiphonal hymenaios for two semi-choruses and Trugaios in celebration of his wedding to Opora.

Trugaios: Come then, come, my bride,
into the fields with me
Sweetly, sweet, abide.
Hymen, Hymenaios O!
Hymen, Hymenaios O!
Chorus: O thrice happy you,
And you well deserve it too.
Hymen, Hymenaios O!
Hymen, Hymenaios O!
Semi-chorus: What shall we do with her?
What shall we do with her?
Semi-chorus: We shall harvest her.
We shall harvest her.
Semi-chorus: O men of the front ranks, praying,
we carry the bridegroom.
Hymen, Hymenaios O!
Hymen, Hymenaios O!
Semi-chorus: Dwell now in peace,
Have nothing to do
But gather figs.
Hymen, Hymenaios O!
Hymen, Hymenaios O!
Semi-chorus: He is large and stout.
Semi-chorus: She is a sweet fig.
Trugaios: So you will think
When you eat and drink much wine.
Chorus: Hymen, Hymenaios O!
Hymen, Hymenaios O!
Trugaios: O farewell, farewell, men,
And go with me,
Eat the bridecakes.[214]

Aristophanes, 272). *Troades* was produced in 415 B.C.E. For an example from the chorus of *Iphigenia Aulidensis*, see p. 110 *supra*.

[214] Lines 1329–57: Τρυγαῖος. δεῦρ' ὦ γύναι, εἰς ἀγρόν, | χὤπως μετ' ἐμοῦ καλὴ | καλῶς κατακείσει. | Ὑμήν, Ὑμέναι' ὦ. | Ὑμήν, Ὑμέναι' ὦ. | Χορός. ὦ τρίσμακαρ, ὡς δικαί|ως τἀγαθὰ νῦν ἔχεις. | Ὑμήν, Ὑμέναι' ὦ. | Ὑμήν, Ὑμέναι' ὦ. | Ἡμιχόριον. τί δράσομεν αὐτήν; | τί δράσομεν αὐτήν; | Ἡμιχόριον. τρυγήσομεν αὐτήν. | τρυγήσομεν αὐτήν. | Ἡμιχόριον. ἀλλ' ἀράμενοι φέρω|μεν οἱ προτεταγμένοι | τὸν νυμφίον, ὦνδρες. | Ὑμήν, Ὑμέναι' ὦ. | Ὑμήν, Ὑμέναι' ὦ. | Ἡμιχόριον. οἰκήσετε γοῦν καλῶς | οὐ πράγματ' ἔχοντες, ἀλ|λὰ συκολογοῦντες. | Ὑμήν, Ὑμέναι' ὦ. | Ὑμήν, Ὑμέναι' ὦ. | Ἡμιχόριον. τοῦ μὲν μέγα καὶ παχύ, | τῆς δ' ἡδὺ τὸ σῦκον. | Τρυγαῖος. φήσεις γ', ὅταν

While the innuendo and erotic word play of this example are perhaps exaggerated for purposes of comedy, the structure of the example, with its use of refrain and antiphonal choruses, accords with Proclus's description of the type.

In addition to the wedding songs, an instrumental solo for the aulos, the gamelion aulema (τὸ γαμήλιον αὔλημα), was played at weddings, according to Pollux's *Onomasticon* (4.75 and 80). Since the aulos was commonly used in processions and to accompany the chorus, a solo could well have been performed on the aulos as part of the wedding music. Still, it may have been a later addition to the traditional wedding songs. Unlike other instrumental compositions, the gamelion aulos music is attested only by Pollux. St. John Chrysostomus, however, specifically and sharply criticizes the aulos music, dancing, singing, and torchlight processions still associated with weddings in his day.[215]

Threnody

The power of music in dissipating grief is well attested in ancient culture. Aristides Quintilianus observes that music was employed in certain "funeral rites to break off the extreme of passion by means of melody,"[216] and details about the type of music, performers, and number of accompanying instruments appear in sources as diverse as the Talmud, Lucian, and the Twelve Tables.[217]

ἐσθίῃς | οἶνόν τε πίῃς πολύν. | Χορός. Ὑμήν, Ὑμέναι' ἰώ. | Ὑμήν, Ὑμέναι' ἰώ. | Τρύγαιος. ὦ χαίρετε χαίρετ' ἄν|δρες, κἂν ξυνέπησθέ μοι, | πλακοῦντας ἔδεσθε.

[215] On the view of St. John Chrysostomus (ca. 347–407 C.E.) on the hymenaios, which was shared by the Council of Laodicea (ca. 380) and Gregory Nazianzus (ca. 329–389 C.E.), see Johannes Quasten, *Musik und Gesang in den Kulten der heidnischen Antike und christlichen Frühzeit,* 2d ed., Liturgiewissenschaftliche Quellen und Forschungen, vol. 25 (Münster: Aschendorff, 1973), 180–85. A slightly different version exists in English as *Music and Worship in Pagan and Christian Antiquity,* trans. Boniface Ramsey, O.P., NPM Studies in Church Music and Liturgy (Washington, D.C.: National Association of Pastoral Musicians, 1983). Some of the relevant passages are translated in James McKinnon, *Music in Early Christian Literature,* Cambridge Readings in the Literature of Music (Cambridge: Cambridge University Press, 1987), 72 and 84–86.

[216] κἀν τοῖς κήδεσι παρείληπται τῆς κατὰ τὸ πάθος ἀκρότητος τῇ μελῳδίᾳ παραθραύσουσα (W.-I. 57.29–31). Mathiesen, *AQ on Music,* 120.

[217] Mishnah, *Ketub* 4.4; Lucian *De luctu 19;* Cicero *De legibus* 2.23.59. For an interesting study of the role of music in the cult of dead, see Quasten, *Musik und Gesang,* 195–203.

The music of lamentation was intended to praise the deceased and provide a release for intense emotions of the bereaved. In his *Quaestiones convivales,* Plutarch observes that threnody (θρηνῳδία) and the "epikedeios aulos" move the emotions and cause tears to flow, thus little by little consuming and removing distress.[218] Lamentation included both the epikedeion (ἐπικήδειον) and the threnos (θρῆνος). A distinction between the two is offered by Proclus's *Chrestomathia*: "The threnos differs from the epikedeion, for the epikedeion is uttered at the funeral itself, while the body is exposed, but the threnos is not limited by time."[219]

Although friends and relatives participated in the lamentation, it is apparent that mourners were also hired to provide the music and other services. Plato refers in *Leges* 7 to the performance of "Carian music" by hired mourners over the corpse, Josephus reports in the *Bellum Judaicum* 3.437 that hired auletes played threnodies during an extended period of mourning after the battle of Jotopata, and Cicero observes in *De legibus* 2.23.59 that the law of the Twelve Tables limited the expense of funerals to "three veils, a purple tunic, and ten auletes."[220]

The aulos was clearly the favored instrument for accompanying threnody. Matthew 9.23, for example, observes that the auletes have already begun playing when Jesus enters the house of Jairus,[221] and Plutarch, in his dialogue on the letter E at Delphi, quotes Sophocles as stating: "neither harp nor lyre is welcome for laments." Plutarch's speaker, Ammonius, then adds:

---

[218] Plutarch *Quaestiones convivales* 3.8 (657a).

[219] διαφέρει δὲ τοῦ ἐπικηδείου ὁ θρῆνος, ὅτι τὸ μὲν ἐπικήδειον παρ' αὐτὸ τὸ κῆδος, ἔτι τοῦ σώματος προκειμένου, λέγεται, ὁ δὲ θρῆνος οὐ περιγράφεται χρόνῳ (Bekker 321a30–33).

[220] οἱ περὶ τοὺς τελευτήσαντας μισθούμενοι Καρικῇ τινὶ Μούσῃ προπέμπουσι (800e2–3); ὡς ἐπὶ τριακοστὴν μὲν ἡμέραν μὴ διαλειπεῖν τὰς ὀλοφύρσεις ἐν τῇ πόλει, πλείστους δὲ μισθοῦσθαι τοὶς αὐλητάς, οἳ θρήνων ἐξῆρχον αὐτοῖς (*Flavii Josephi Opera. Graece et latine,* ed. Wilhelm Dindorf, Scriptorum graecorum bibliotheca, vols. 21, 27 [Paris: Firmin Didot, 1845-47], 2:173); "tribus riciniis et tunicla purpurea et decem tibicinibus" (*Cicero in Twenty-Eight Volumes,* vol. 16, *De re publica, De legibus,* trans. Clinton Walker Keyes, Loeb Classical Library [Cambridge: Harvard University Press, 1928], 444).

[221] Καὶ ἐλθὼν ὁ Ἰησοῦς εἰς τὴν οἰκίαν τοῦ ἄρχοντος καὶ ἰδὼν τοὺς αὐλητὰς καὶ τὸν ὄχλον θορυβούμενον ἔλεγεν· ἀναχωρεῖτε· οὐ γὰρ ἀπέθανεν τὸ κοράσιον ἀλλὰ καθεύδει (Nestle). Cf. St. John Chrysostomus's comment on this passage in McKinnon, *Music in Early Christian Literature,* 84.

> And the aulos only recently, and after a long time, ventured to utter a sound on things of desire, but during the early period, it was drawn to mournings and performed on these occasions a public service—though neither a highly prized nor cheerful one.[222]

The relationship of the aulos to lamentation is also made clear in the Plutarchean *De musica,* where Soterichus, on the authority of Aristoxenus, asserts that the aulete Olympus performed an epikedeion for the Python in the Lydian mode (Λυδιστί), but he adds that others credit this melos to Melanippides, the notorious innovator associated with Timotheus and Philoxenus.[223] Plato, in the famous passage restricting the music of the Republic to the Dorian and Phrygian harmoniai, considers the Mixolydian and Intense Lydian harmoniai threnodic.[224]

Scenes of mourning appear in the *Iliad* (24.720–22), where singers perform threnoi over the body of Hector, and in the *Odyssey* (24.60–61), where Achilles himself is mourned by the Muses in antiphonal song. Such a scene appears on a Corinthian hydria of the sixth century B.C.E.[225]

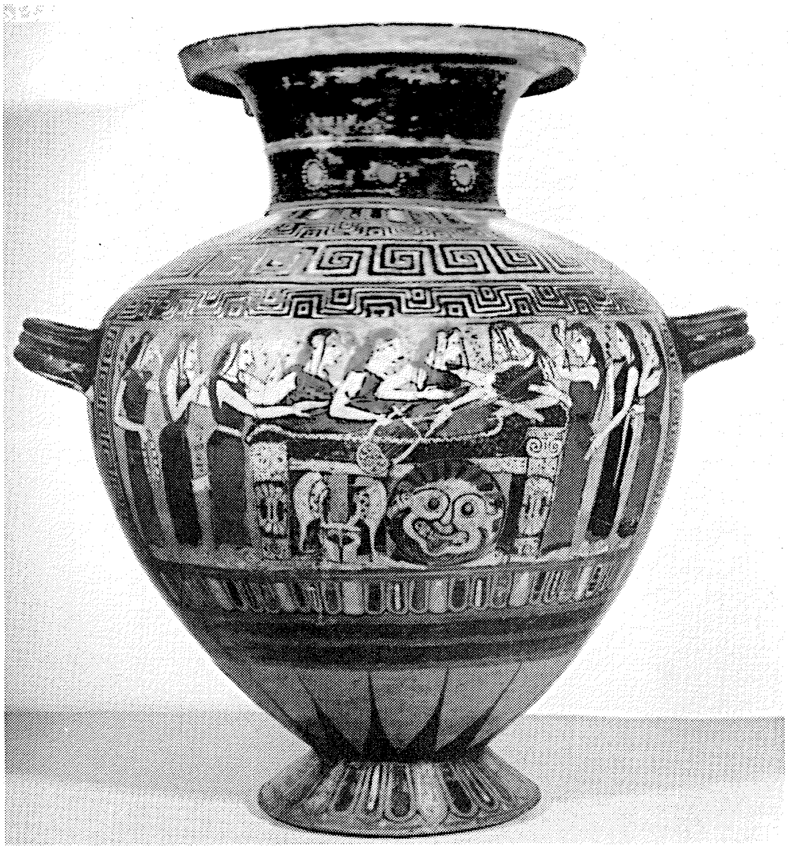
---

[222] "οὐ νάβλα κωκυτοῖσιν οὐ λύρα φίλα." Καὶ γὰρ ὁ αὐλὸς ὀψὲ καὶ πρῴην ἐτόλμησε φωνὴν "ἐφ' ἱμερόεσιν" ἀφιέναι· τὸν δὲ πρῶτον χρόνον εἵλκετο πρὸς τὰ πένθη, καὶ τὴν περὶ ταῦτα λειτουργίαν οὐ μάλ' ἔντιμον οὐδὲ φαιδρὰν εἶχεν (text from *Plutarch's Moralia,* 5:252). The Sophocles quotation is fragment 765.

[223] Plutarch *De musica* 1136c (Ziegler 13.3–9)=Aristoxenus fr. 80.

[224] Plato *Respublica* 3.10 (398e–399a). On the harmoniai, see chapters 5–6.

[225] Paris, Musée du Louvre, E 643.



© photographie Musée du Louvre—M. et P. Chuzeville

Figure 10.

Fragments of threnoi by Simonides have been preserved by Stobaeus, but they are too short to provide much sense of the content of this type. Longer fragments do exist, but they have been classed as threnoi only by modern scholars; in the sources themselves, the fragments are not assigned a particular type or are described as encomia, a specific type in its own right.[226]

A number of fragments presumed to be threnoi by Pindar survive, and they provide a clearer sense of the style and content of the genre. In fragment 129 + 130 (95), the souls of the deceased are pictured in various ways; some play the phorminx or draughts, others wrestle, and still others amuse themselves with horses.[227] In fragment 139, self-conscious musical references accompany a dirge (αἴλινος) for Linus, Hymenaios, and Ialemos:

---

[226] See *Lyra Graeca*, vol. 2, rev. ed. by J. M. Edmonds, Loeb Classical Library (Cambridge: Harvard University Press, 1931), 2:288–99. Cf. *Greek Lyric*, 3:416–25.

[227] On the importance of music in the afterlife, see Quasten, 204–11 (153–57 in the English edition).

> There are songs of paeans, coming in due season, which belong to the children of Leto of the golden distaff. There are also songs that, from amid the crowns of flourishing ivy, long for the dithyramb of Dionysus; but in another song did three goddesses lull to rest the bodies of their sons. One hymns a dirge for clear-voiced Linus, another sings in her newest hymns for Hymenaios (whom Fate seized when he first lay touching another in wedlock), ...[228]

As three gods are the subject of this lament, the fragment is perhaps better regarded as a stylized threnos than as a functional piece used in a particular funeral. It is, of course, possible that the gods provide a framework of poetic imagery for laudatory reminiscences of the deceased that no longer survive.

In a sense, the hymenaios and the threnody represent the two extremes of music in daily life: the one marks the beginning of adult life, the other the end. Because they were both so closely tied to particular individuals and events, it is hardly surprising that so few fragments of these two types survive.

Epinikion and encomium

A victor in one of the great sporting events of the various festivals was celebrated at his homecoming by an epinikion (ἐπινίκιον). Epinikia were grand in scope and eulogized the victor, his family, and his city. The victor's triumph was related to life in general through various moral reflections and analogy with the heroic deeds of the gods. Epinikia were also composed in honor of victorious warriors.[229]

Fragments of verse by Simonides survive celebrating runners, pentathlon champions, wrestlers, boxers, and horse- and mule-charioteers. Some of these are specifically identified as epinikia by the sources, but some may represent the encomium (ἐγκώμιον).[230] Most of the short fragments are epigrammatic in character, and this is probably the reason why they are preserved. As an example, Aristotle notes in *Rhetorica* 3.2 that Simonides once refused to compose for the victor of a mule-cart race because the fee was too small. When the fee was increased, however, he accepted the commission. Aristotle quotes only a single line from this composition: "Hail, daughters of storm-footed steeds."[231] Like the fragments of his threnoi, these are too short to provide much sense of Simonides's victory odes.

---

[228] Threni, fr. 128c1–9: Ἔντι μὲν χρυσαλακάτου τεκέων Λατοῦς ἀοιδαί | ὥ[ρ]ιαι παιάνιδες· ἐντὶ [δὲ καί] | θάλλοντος ἐκ κισσοῦ στεφάνων {ἐκ} Διο[νύσου | . [... ... .μ]αιόμεναι· τὸ δὲ κ̣ο̣ι̣[..]αν | τ̣ρεῖς [desunt ca. 15ll.] σ̣ώ̣μ̣α̣τ̣’ ἀποφθιμένων· | ἁ μὲν ἀχέταν Λίνον αἴλινον ὕμνει, | ἁ δ’ Ὑμέναιον, ⟨ὃν⟩ ἐν γάμοισι χροϊζόμενον | [Μοῖρα] σύμπρωτον λάβεν, | ἐσχάτοις ὕμνοισιν· (Maehler, pt. 2). Translation adapted from Sandys, *Odes of Pindar*, 595. Barker, *Greek Musical Writings*, 1:61 provides a slightly different translation (as fragment 126); see also his explanatory notes. The supposed threnoi are conveniently collected and translated in Sandys, *Odes of Pindar*, 588–95.

[229] Proclus's *Chrestomathia* provides no details on the form; it simply states: ὁ δὲ ἐπίνικος ὑπ’ αὐτὸν τὸν καιρὸν τῆς νίκης τοῖς προτεροῦσιν ἐν τοῖς ἀγῶσιν ἐγράφετο (Bekker 321a2–3).

While the epinikia of Simonides survive only in brief quotation, the four substantial books of epinikia by Pindar are among the great monuments of Greek lyric. Each of the books corresponds to one of the four festivals—the Olympia, Pythia, Isthmia, and Nemea[232]—and a number of the epinikia can be assigned to particular festivals and victors.

Pindar's style was widely admired. Dionysius of Halicarnassus, in describing the lines of an excerpt from one of Pindar's dithyrambs, observes in *De compositione verborum* 22:

> That these lines are vigorous, weighty, and dignified, and possess much austerity; that they are not unpleasantly rough and are measuredly sharp to the ears; that they are slow in their chronoi and range over many harmoniai; and that they exhibit not the current theatrical and decorative beauty but rather the archaic and austere beauty of the past—all this, I think, would be attested by those who have a moderate sense of words.[233]

---

[230] The fragments, which are conveniently collected and translated in *Lyra Graeca*, 2:300–332 (cf. *Greek Lyric*, 3:368–416), are recorded by scholiasts and authors such as Photius, Aristotle, Lucian, Aristophanes, Cicero, Plutarch, and Athenaeus. The epinikion and encomium are frequently confused, even by early sources. See, for example, Athenaeus *Deipnosophistae* 13.33 (573f), where Pindar's thirteenth Olympian Ode is described as an encomium. The *Etymologicon magnum*, s.v. ἐγκώμιον (311.26–32), by contrast, considers the encomium to be a satirical or protest song sung at night in the alleyways of the city (ἐν κώμας).

[231] χαίρετ' ἀελλοπόδων θύγατρες ἵππων.

[232] On the festivals, see nn. 30 and 111 *supra*.

[233] ταῦθ' ὅτι μέν ἐστιν ἰσχυρὰ καὶ στιβαρὰ καὶ ἀξιωματικὰ καὶ πολὺ τὸ αὐστηρὸν ἔχει τραχύνει τε ἀλύπως καὶ πικραίνει μετρίως τὰς ἀκοὰς ἀναβέβληταί τε τοῖς χρόνοις καὶ διαβέβηκεν ἐπὶ πολὺ ταῖς ἁρμονίαις καὶ οὐ τὸ θεατρικὸν δὴ τοῦτο καὶ γλαφυρὸν ἐπιδείκνυται κάλλος ἀλλὰ τὸ ἀρχαϊκὸν ἐκεῖνο καὶ αὐστηρόν, ἅπαντες ἂν εὖ οἶδ' ὅτι μαρτυρήσειαν οἱ μετρίαν ἔχοντες αἴσθησιν περὶ λόγους (Roberts 216.16–218.1).

The epinikia of Pindar make abundant use of metaphor, and references to specific musical characteristics are also common. Where possible, Pindar tries to introduce some myth related to the country of the victor, normally in the middle of the epinikion.

The structure of the epinikia is strophic, and for the most part, they use the triadic form of strophe, antistrophe, and epode. The strophe and antistrophe, of course, correspond in metric structure, while the epode employs a different structure. In Pindar's compositions, where multiple triadic groups appear, the epodes correspond in metric structure. His epinikia make use of three basic rhythmic patterns: the paeonic, the dactylo-epitritic, and the logaoedic.[234] Pindar describes one dactylo-epitritic epinikion as Dorian and one logaoedic epinikion as Aeolian, but there are also references to the Lydian aulos, harmonia, and mode (τρόπος) in both rhythmic types. The references to Dorian and Aeolian would seem to pertain more to the overall style of the epinikia than to any specific tonos or harmonia.[235]

Since the epinikia were commissioned after a victory was won, they were not performed on the occasion of the victory but later, perhaps at the victor's homecoming or the anniversary of the competition. They are intended for chorus, but the exact size and composition of the chorus are unknown. The singers also danced and were accompanied, generally by the phorminx but also on occasion by auloi.[236]

---

[234] The first two patterns have already been encountered in connection with the hymn and the paean (see pp. 33 and 40 *supra*); the logaoedic is based on a combination of dactyls and trochees. Aristides Quintilianus *De musica* 1.24 defines the logaeodic as a dactylic meter with the first foot replaced by an iamb, a trocheee, or a pyrrhic. Hephaestion *Ench.* 7, 8 (Consbruch 24.1–10 and 28.9–32) and the scholia (Consbruch 130.8–23 and 275.1–12) place the alternate as the penultimate foot in the meter.

[235] See *Olympia* 1.102 (Aeolian) and 3.5 (Dorian); and Lydian references at *Olympia* 5.19 and 14.17 and *Nemea* 4.45 and 8.15. The epinikia are conveniently collected and translated in Sandys, *Odes of Pindar,* 2–507. There is no reason whatsoever to assume, as does Sandys (ibid., xxxv), that all the dactylo-epitritic odes are in the Dorian and all the logaoedic in Aeolian mode. On the harmonia and tonoi in general, see chapters 5–6.

[236] Details of performance practice can be deduced from references in the epinikia themselves. On the youthfulness of the chorus, see *Pythia* 5.103–4; *Nemea* 3.3–5; *Isthmia* 8.1–4; on the accompaniment, see *Olympia* 2.1; *Pythia* 1.1–3; *Nemea* 9.8; *Isthmia* 2.2; etc.

Several examples of Pindar's compositions have already been presented in this chapter, including part of the twelfth Pythian Ode,[237] written in honor of Midas of Acragas, the prize-winning aulete at the twenty-fourth and twenty-fifth Pythian festivals in 490 and 486 B.C.E. Although this composition is intended specifically for a musician and contains numerous musical references, similar types of musical imagery appear in other epinikia. For example, the beginning of the first Pythian Ode evokes the sound of the phorminx:

> Gold phorminx, owned alike by Apollo and by the violet-tressed Muses, the dance-step, as it begins the gladsome dance, hears you, and the singers obey your signs, when, with your quivering strings, you create the introduction to the choir-leading prelude.[238]

The first triad (strophe, antistrophe, and epode) of the third Olympian Ode includes references to the "Dorian step," the combined accompaniment of the phorminx and the aulos, and the general festivity of the music in honor of Theron of Acragas, winner of the chariot race at the Olympian Festival of 476 B.C.E.:

> I pray that I may find favor with the hospitable sons of Tyndareüs and with fair-haired Helen, while I honor the famous Acragas, by duly ordering my song in praise of Theron's victory at Olympia, as the choicest guerdon for those steeds with unwearied feet. So has the Muse stood beside me, when I discovered a bright new mode to harmonize the voice of the festive revellers with the Dorian step. For the crowns that are about my hair prompt me to pay this sacred debt, that so, in honor of the son of Aenesidamus, I may duly blend the varied speech of the phorminx and the sound of the auloi with the setting of the hexameters, while Pisa bids me raise my voice—Pisa from which heaven-sent songs are wafted over the world in honor of any man ...[239]

---

[237] See p. 64 *supra*. See also excerpts on pp. 38–39, 76–78, 86, 89–90, and 136 *supra*.

[238] *Pythia* 1.1–4: {A'} Χρυσέα φόρμιγξ, Ἀπόλλωνος καὶ ἰοπλοκάμων | σύνδικον Μοισᾶν κτέανον· τᾶς ἀκούει μὲν βάσις ἀγλαΐας ἀρχά, | πείθονται δ' ἀοιδοὶ σάμασιν | ἁγησιχόρων ὁπόταν προοιμίων ἀμβολὰς τεύχῃς ἐλελιζομένα (Maehler, pt. 1). Translation adapted from Sandys, *Odes of Pindar*, 155.

[239] *Olympia* 3.1–10: {A'} Τυνδαρίδαις τε φιλοξείνοις ἁδεῖν καλλιπλοκάμῳ θ' Ἑλένᾳ | κλεινὰν Ἀκράγαντα γεραίρων εὔχομαι, | Θήρωνος Ὀλυμπιονίκαν ὕμνον ὀρθώσαις, ἀκαμαντοπόδων | ἵππων ἄωτον. Μοῖσα δ' οὕτω ποι παρέστα μοι νεοσίγαλον εὑρόντι τρόπον | Δωρίῳ φωνὰν ἐναρμόξαι πεδίλῳ | ἀγλαόκωμον. ἐπεὶ χαίταισι μὲν ζευχθέντες ἔπι στέφανοι | πράσσοντί με τοῦτο θεόδματον χρέος, | φόρμιγγά τε ποικιλόγαρυν καὶ βοὰν αὐλῶν ἐπέων τε θέσιν | Αἰνησιδάμου παιδὶ συμμῖξαι πρεπόντως, ἅ τε Πίσα με γεγωνεῖν· τᾶς ἄπο | θεόμοροι νίσοντ' ἐπ' ἀνθρώπους ἀοιδαί ... (Maehler, pt. 1). Translation adapted from Sandys, *Odes of Pindar*, 33.

The meter of both these odes is dactylo-epitritic, and the large number of long syllables in their rhythm accords perfectly with Dionysius of Halicarnassus's description of Pindar's style as slow and dignified. The first ten lines of the third Olympian illustrate the rhythmic pattern and strophic responsion:[240]

Τυνδαρίδαις τε φιλοξείνοις ἁδεῖν καλλιπλοκάμῳ	–⏑⏑–⏑⏑–––⏑–––⏑⏑–
θ' Ἑλένα	⏑⏑–
κλεινὰν Ἀκράγαντα γεραίρων εὔχομαι,	––⏑⏑–⏑⏑–––⏑–
Θήρωνος Ὀλυμπιονίκαν ὕμνον ὀρθώσαις,	––⏑⏑–⏑⏑–––⏑–––
ἀκαμαντοπόδων	⏑⏑–⏑⏑–
ἵππων ἄωτον. Μοῖσα δ' οὕτω ποι παρέστα μοι	––⏑–––⏑–––⏑–––
νεοσίγαλον εὑρόντι τρόπον	⏑⏑–⏑⏑–––⏑–
Δωρίῳ φωνὰν ἐναρμόξαι πεδίλῳ	–⏑–––⏑–––⏑––

and

ἀγλαόκωμον. ἐπεὶ χαίταισι μὲν ζευχθέντες ἔπι	–⏑⏑–⏑⏑–––⏑–––⏑⏑–
στέφανοι	⏑⏑–
πράσσοντί με τοῦτο θεόδματον χρέος,	––⏑⏑–⏑⏑–––⏑–
φόρμιγγά τε ποικιλόγαρυν καὶ βοὰν αὐλῶν	––⏑⏑–⏑⏑–––⏑–––
ἐπέων τε θέσιν	⏑⏑–⏑⏑–
Αἰνησιδάμου παιδὶ συμμῖξαι πρεπόντως, ἅ	––⏑–––⏑–––⏑–––
τε Πίσα με γεγωνεῖν· τᾶς ἄπο	⏑⏑–⏑⏑–––⏑–
θεόμοροι νίσοντ' ἐπ' ἀνθρώπους ἀοιδαί	⏑⏑⏑–––⏑–––⏑––

In the context of logaoedic rhythm, the second strophe of the fourteenth Olympian Ode makes specific reference to the dancing chorus of performers and the Lydian mode of this composition, written in honor of Asopichus, who won the boys' short foot-race, perhaps in 488 B.C.E.:

> O queen Aglaïa and Euphrosyne, who love dance and song, daughters of the mightiest of the gods; and Thalia, enamored of dance and song, when you have looked upon this procession lightly stepping in honor of the victor's good fortune, listen now. For I have come to sing of Asopichus in practiced

---

Other examples of the combined accompaniment of stringed and wind instruments appear in *Olympia* 7.12–13; 10.93–94.

[240] Other dactylo-epitritic odes are *Olympia* 6, 7, 8, 11, and 12; *Pythia* 3, 4, 9, and 12; *Nemea* 1, 5, 8, and 9; and *Isthmia* 1–6. Pearson, "Dynamics of Pindar's Music," 64, proposes arranging the lines of this Ode and the ninth Nemean in a somewhat different manner in order to better fit the musical demands—as he envisions them—of the text. While his analysis is generally persuasive, the rhythmic pattern and responsion remain the same regardless of the precise arrangement of the lines.

> songs in the Lydian mode, because, thanks to you, the house of Minyae is victorious in Olympia. Go now, Echo, to the dark-walled home of Persephone and carry the glorious tidings to the father so that when you have seen Cleodamus, you may tell him that his son, beside the famous vales of Pisa, has crowned his youthful locks with the glorious crown of victory.[241]

In view of music's role in Greek funeral rites, it is of interest to note that the song is presumed to have the power of carrying the news of the victory to winner's deceased father. This may be a poetic affectation, but there is no reason to assume that the poet and his audience did not regard the epinikion as a means of celebrating and memorializing the victory far and wide, even to the departed spirits. A comparison of the first four lines of this strophe with those of the first strophe illustrates the rhythm and the responsion:

Καφισίων ὑδάτων	––⏑–⏑⏑–
λαχοῖσαι, αἵτε ναίετε καλλίπωλον ἕδραν,	⏑–⏑–⏑–⏑⏑–⏑–⏑––
ὦ λιπαρᾶς ἀοίδιμοι βασίλειαι	–⏑⏑–⏑–⏑–⏑⏑––
χάριτες Ὀρχομενοῦ, παλαιγόνων Μινυᾶν	⏑⏑⏑–⏑⏑–⏑–⏑–⏑⏑–
ἐπίσκοποι	⏑–⏑–

and

⟨ὦ⟩ πόντι' Ἀγλαΐα	––⏑–⏑⏑–
φιλησίμολπέ τ' Εὐφροσύνα, θεῶν κρατίστου	⏑–⏑–⏑–⏑⏑–⏑–⏑––
παῖδες, ἐπακοοῖτε νῦν, Θαλία τε	–⏑⏑–⏑–⏑–⏑⏑––
ἐρασίμολπε, ἰδοῖσα τόνδε κῶμον ἐπ' εὐ-	⏑⏑⏑–⏑⏑–⏑–⏑–⏑⏑–
μενεῖ τύχᾳ	⏑–⏑–

The epinikia of Bacchylides were known only in fragmentary form until the end of the nineteenth century, when a papyrus of the first century B.C.E. (*P.Lond.* 733) was discovered, which contains fifteen of his epinikia. These are similar to Pindar's odes in some respects, but they tend to be more subdued and lack self-conscious musical references. In a few cases, both Pindar and Bacchylides write epinikia for the same victor. For example, Pindar's first Pythian Ode, noted above, was written for Hieron of Aetna, winner of the chariot-race in the Pythian Festival of 470 B.C.E., as was Bacchylides's Ode 4:

---

[241] *Olympia* 14.13–24: ⟨ὦ⟩ πόντι' Ἀγλαΐα | φιλησίμολπέ τ' Εὐφροσύνα, θεῶν κρατίστου | παῖδες, ἐπακοοῖτε νῦν, Θαλία τε | ἐρασίμολπε, ἰδοῖσα τόνδε κῶμον ἐπ' εὐμενεῖ τύχᾳ | κοῦφα βιβῶντα· Λυδῷ γὰρ Ἀσώπιχον τρόπῳ | ἔν τε μελέταις ἀείδων ἔμολον, | οὕνεκ' Ὀλυμπιόνικος ἁ Μινυεία | σεῦ ἕκατι. μελανοτειχέα νῦν δόμον | Φερσεφόνας ἔλθ', Ἀχοῖ, πατρὶ κλυτὰν φέροισ' ἀγγελίαν, | Κλεόδαμον ὄφρ' ἰδοῖσ', υἱὸν εἴπῃς ὅτι οἱ νέαν | κόλποις παρ' εὐδόξοις Πίσας | ἐστεφάνωσε κυδίμων ἀέθλων πτεροῖσι χαίταν (Maehler, pt. 1). Translation adapted from Sandys, *Odes of Pindar,* 147 and 149.

> The golden-haired Apollo still loves the city of Syracuse and honors Hieron, the upholder of public right. For a third time, he is sung along with the prowess of swift-footed horses for a victory won beside the center of a high-cliffed land at Pytho.[242]

Hieron is also celebrated in Bacchylides's Ode 3 for his victory in the chariot-race of the Olympian Festival in 468 B.C.E.

The epinikia are, in a sense, the formal counterparts of the hymn and the paean. While the hymn and the paean served devotional, religious, and larger civic purposes, the epinikia provided a means of memorializing the important personal and human victories of the national festivals or heroic warriors.

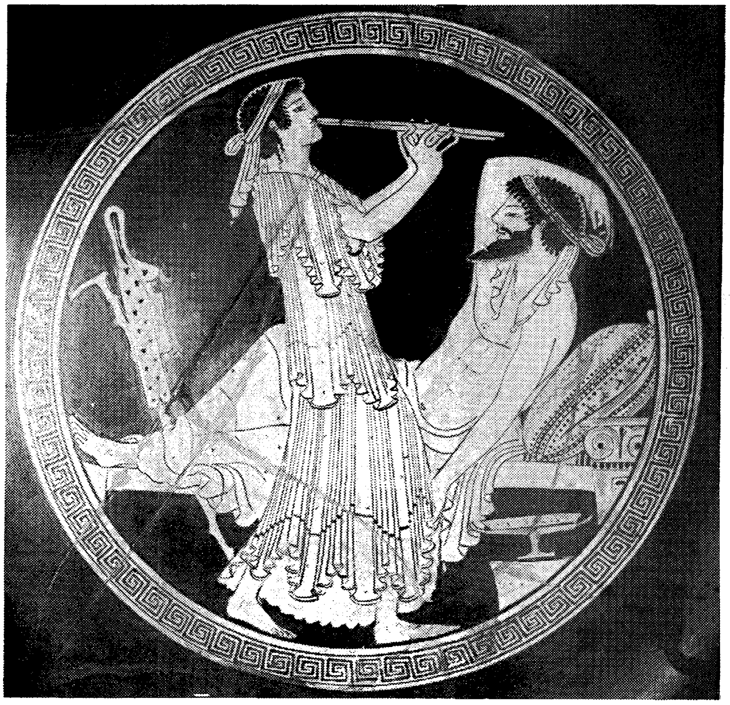
Skolion and sillos

One of the most important social institutions for aristocratic Greek men was the symposium (συμπόσιον), a drinking party that followed the evening meal. Reclining on couches, the men engaged in conversation, told riddles, and played games, while food and a mild wine mixed with water were served on low tables set in front of the couches. Plutarch's *Septem sapientium convivium,* his nine books of *Quaestiones convivales,* and Plato's *Symposium* convey a sense of the range and nature of the topics pursued at the symposium. In addition to the conversation and games, entertainment was provided by a female aulete and professional singers and dancers. The guests themselves were also expected to sing, and some of the poetry of Alcaeus, Anacreon, Archilochus, and Theognis, among others, was sung at these gatherings. Symposium scenes were quite popular as subjects for paintings on drinking cups. One such cup from the early fifth century B.C.E. (figure 11) illustrates the typical characteristics.[243]

---

[242] {A'} Ἔτι Συρακοσίαν φιλεῖ | πόλιν ὁ χρυσοκόμας Ἀπόλλων, | ἀστύθεμίν θ' Ἱέρωνα γεραίρει· | τρίτον γὰρ παρ' ὀμφαλὸν ὑψιδείρου χθονὸς | Πυθιόνικος ἀείδεται | ὠκυπόδ[ων ἀρετᾷ] σὺν ἵππων (*Lyra Graeca,* 3:142–44; *Greek Lyric,* 4:136).

[243] Red-figure drinking cup, Paris, Musée du Louvre, G 135. The cup is attributed to the Colmar Painter. The spotted bag hanging on the back wall in the painting is the aulos bag, and the smaller bag attached to it held the aulete's reeds.



Alinari/Art Resource, NY

Figure 11.

Greek writers differ among themselves in their descriptions of the skolion (σκόλιον), and it seems that the term was applied to several different types of song performed at symposia. Though they may not have been practiced at every symposium, two characteristics of performance were common: the guests sang successively, perhaps most often in random order; and following the order of singers, a myrtle branch passed from guest to guest. In addition, the singers were expected to accompany themselves on the lyre. Plutarch describes the process in Book I, question 1, of his *Quaestiones convivales*:

> As for the skolia, some say that they do not belong to a type of obscurely constructed songs, but that first the guests would sing the god's song together, singing the paean with one voice, and next when to each in turn was given the myrtle spray (which they called aisakos, I think, because the man to receive it sings) and too the lyre was passed around, the guest who could play the instrument would take it and tune it and sing, while the unmusical would refuse, and thus the skolion owes its name to the fact that it is not sung by all and is not easy. But others say that the myrtle spray did not proceed from each guest to his neighbor in orderly sequence, but was passed across from couch to couch each time, that the first man to sing sent it over to the first man on the second couch, and the latter to the first man on the third couch, then the second man to the second on the neighboring couch, and so on;

> so, they say, it seems the song was named skolion because of the intricate and twisted character of its path.[244]

Plutarch's etymology is based on the similarity among the terms σκόλιον, σκολιόν, and δύσκολος. Among other things, σκολιόν means "winding" or "obscure," while δύσκολος means "difficult." The skolion may therefore be seen as "obscurely constructed," winding its way around the room from couch to couch, or difficult to sing. In some cases, skolia may have been composed of verses improvised sequentially by each guest, while in other cases, one guest might begin a traditional song by Simonides or Stesichorus, hand the myrtle to another guest, who would be expected to continue the song until he handed the myrtle to the next guest, and so on.

In defining the skolion, Proclus's *Chrestomathia* adds some detail. The skolion, it seems, could be biting or satirical in character, and it was influenced by Dionysian intoxication:

> The skolion melos was sung at drinking parties, on which account they sometimes call it a drinking song. It is free in construction and extremely simple. It is called "skolion" not, as some suppose, by antiphrasis (for words by antiphrasis most often aim at euphemism, not at changing a positive remark into a evil report) but rather because when the senses are overpowered and the disciples are near the wine, the barbiton is carried into the symposia, and under the influence of Dionysus, each guest is precariously interrupted in the utterance of the song. When those who are intoxicated turn this into melos, they call it, most simply, the skolion.[245]

---

[244] Ἐπεί τοι καὶ τὰ σκόλιά φασιν οὐ γένος ᾀσμάτων εἶναι πεποιημένων ἀσαφῶς, ἀλλ' ὅτι πρῶτον μὲν ᾖδον ᾠδὴν τοῦ θεοῦ κοινῶς ἅπαντες μιᾷ φωνῇ παιανίζοντες, δεύτερον δ' ἐφεξῆς ἑκάστῳ μυρσίνης παραδιδομένης, ἣν αἴσακον οἶμαι διὰ τὸ ᾄδειν τὸν δεξάμενον ἐκάλουν, ἐπὶ δὲ τούτῳ λύρας περιφερομένης ὁ μὲν πεπαιδευμένος ἐλάμβανε καὶ ᾖδεν ἁρμοζόμενος, τῶν δ' ἀμούσων οὐ προσιεμένων σκολιὸν ὠνομάσθη τὸ μὴ κοινὸν αὐτοῦ μηδὲ ῥᾴδιον. ἄλλοι δέ φασι τὴν μυρσίνην οὐ καθεξῆς βαδίζειν, ἀλλὰ καθ' ἕκαστον ἀπὸ κλίνης ἐπὶ κλίνην διαφέρεσθαι· τὸν γὰρ πρῶτον ᾄσαντα τῷ πρώτῳ τῆς δευτέρας κλίνης ἀποστέλλειν, ἐκεῖνον δὲ τῷ πρώτῳ τῆς τρίτης, εἶτα τὸν δεύτερον ὁμοίως τῷ δευτέρῳ, καὶ τὸ ποικίλον καὶ πολυκαμπὲς ὡς ἔοικε τῆς περιόδου σκολιὸν ὠνομάσθη (615b–c [text from *Plutarch's Moralia*, 8:22]). I have very slightly adapted the translation from *Plutarch's Moralia*, 8:23. The random sequence of singers and the passing of the myrtle is also observed by the scholiast to Plato *Gorgias* 451e, citing Aristoxenus and Phyllis, and by the scholiast to Aristophanes *Nubes* 1364, citing Dicaearchus's treatise on musical competitions (περὶ μουσικῶν ἀγώνων). For text and translation, see *Lyra Graeca*, 3:548–51; *Greek Lyric*, 5:274–77 (see also fragments 43 and 44 in *Fragmenta historicorum Graecorum*, 5 vols., ed. K. Müller [Paris: Didot, 1841–70]).

[245] Τὸ δὲ σκόλιον μέλος ᾔδετο παρὰ τοὺς πότους· διὸ καὶ παροίνιον αὐτὸ ἔσθ' ὅτε καλοῦσιν· ἀνειμένον δέ ἐστι τῇ κατασκευῇ καὶ ἁπλούστατον μάλιστα. Σκόλιον δὲ

In this comment on antiphrasis, Proclus is at variance with the scholiast to Plato's *Gorgias* 451e, who states:

> In the Prytaneum of Athens skolia were sung while drinking to certain men such as Harmodius, Admetus, Telamon; and this type of song was called "skolion" by antiphrasis because they were easy to sing and had only a few lines like epigrams; they were called "skolia" because the drinking companions offered the sprig to each other in turn and those who did not sing were shown to be uncultured.[246]

On the other hand, Proclus's observation about the satirical character of the skolion is supported by Aristophanes's *Vespae* 1216–62, which offers an amusing glimpse of the singing at a symposium. Scholiasts commenting on lines 1222 and 1239 of Aristophanes's *Vespae* observe that the songs were called "skolia" because it was difficult to pick up a piece at some point in the middle without any warning or preparation.[247]

Whether or not all skolia were satirical, the sillos (σίλλος) was a particular satirical type of song, and it may very well have served as a skolion. Proclus's *Chrestomathia* states only that the sillos cautiously disparages and ridicules men. The *Etymologicon magnum*, while repeating this same description, provides a fuller explanation:

> Silloi, jests; by changing the tau into a sigma, certain tweakings [τίλλοι]. For to tweak is to jest, as Anacreon says: "the warrior tweaks his beans"; i.e., he jests and scoffs. A scoffing poem is made evident by shaking the ἴλλοι and ridiculing in the look of the eyes (for they say that ἴλλοι are eyes). And to

---

εἴρηται οὐχ, ὡς ἐνίοις ἔδοξε, κατὰ ἀντίφρασιν· τὰ γὰρ κατὰ ἀντίφρασιν ὡς ἐπίπαν τοῦ εὐφημισμοῦ στοχάζεται, οὐκ εἰς κακοφημίαν μεταβάλλει τὸ εὔφημον· ἀλλὰ διὰ τὸ προκατειλημμένων ἤδη τῶν αἰσθητηρίων καὶ παρειμένων οἴνῳ τῶν ἀκροατῶν, τηνικαῦτα εἰσφέρεσθαι τὸ βάρβιτον εἰς τὰ συμπόσια καὶ διονυσιάζοντα ἕκαστον ἀκροσφαλῶς συγκόπτεσθαι περὶ τὴν προφορὰν τῆς ᾠδῆς. Ὅπερ οὖν ἔπασχον αὐτοὶ διὰ τὴν μέθην τοῦτο τρέψαντες εἰς τὸ μέλος, σκόλιον ἐκάλουν τὸ ἁπλούστατον (Bekker 321a3–15, as emended in Henry, 162). The barbiton (or barbitos) is commonly associated with Dionysus (see chapter 3, pp. 249–53 *infra,* for a discussion of this instrument).

[246] Ἀθήνησιν ἐν τῷ πρυτανείῳ παρὰ πότον σκόλια ᾔδετο εἴς τινας, ὥσπερ εἰς Ἁρμόδιον, Ἄδμητον, Τελαμῶνα· εἰρῆσθαι δὲ αὐτὸ σκολιὸν κατ' ἀντίφρασιν, ὅτι ῥᾴδια καὶ ὀλιγόστιχα ὡς ἐπιγράμματα ᾔδετο ἃ ἐκαλεῖτο σκόλια, ἀντιπροτεινόντων ἀλλήλοις τῶν συμποτῶν, καὶ ἠλέγχοντο οἱ μὴ ᾄδοντες ὡς ἄμουσοι (*Lyra Graeca,* 3:550; *Greek Lyric,* 5:276). The explanations are once again based on the multiple meanings of the terms.

[247] *Lyra Graeca,* 3:552–55; *Greek Lyric,* 5:274.

> mock [σιλλαίνειν] is to squint. The sillos cautiously disparages and ridicules men; it is a melos.[248]

Soterichus, speaking in the Plutarchean *De musica* (1140f), states in passing that Pindar credited Terpander as the inventor of the skolion melos. Although not precisely confirming Soterichus's statement, a fragment of a eulogy to Hieron of Syracuse by Pindar does make reference to Terpander and the music of the banquets:

> … the barbitos, which was first found long ago by Terpander of Lesbos in the banquets of the Lydians, where he heard the concordant sound of the high pektis … Nor let joy in life grow dim; for man, much the best is a life of delight.[249]

Athenaeus emphasizes the ancient and simple style of skolia and names Alcaeus, Anacreon, and Praxilla as famous exponents.[250] Twenty-five skolia are preserved in his *Deipnosophistae* 15.49–50 (693f–696a), perhaps drawn from the collection of Artemon Kasandreus. On Artemon's authority, Athenaeus defines three types of skolia: an initial nomos sung by all the guests at the symposium; a sequence of verses in which the men sing one after another; and a series of songs performed by select singers in whatever order occurred. This accords in general with Plutarch's description and with the scholiast to Plato's *Gorgias* 451e, where the definitions are ascribed to Dicaearchus's treatise on musical competitions (περὶ μουσικῶν ἀγώνων). Athenaeus, however, asserts that "skolion" does not refer so much to a particular type of melic composition (ὁ τῆς μελοποιίας τρόπος) as to the irregular performance, moving from person to person. The skolia presented by Athenaeus would seem to fall primarily in his second category: they are short and simple, with texts ranging over historical incidents, life in general, and personal sentiment. None is satirical in the sense suggested by Proclus's definition.

---

[248] *Chrestomathia*: ὁ δὲ σίλλος λοιδορίας καὶ διασυρμοὺς πεφεισμένως ἀνθρώπων ἔχει (Bekker 321a28–30); *Etymologicon magnum*: Σίλλοι, ἐπισκώματα, κατὰ τροπὴν τοῦ τ εἰς σ, τίλλοι τινές· τίλλειν δὲ, τὸ σκώπτειν, ὡς λέγει Ἀνακρέων, τίλλει τοὺς κυάμους ἀσπιδιώτης:– οἷον σκώπτει καὶ χλευάζει. δηλοῖ δὲ καὶ χλευαστικὸν ποίημα· παρὰ τὸ διασείειν τοὺς ἴλλους καὶ διασύρειν τῷ σχήματι τῶν ὀφθαλμῶν· ἴλλοι γὰρ λέγονται οἱ ὀφθαλμοί· καὶ σιλλαίνειν, τὸ στραβίζειν· ὁ γὰρ σίλλος λοιδορίας καὶ διασυρμοὺς πεφεισμένως ἀνθρώπων ἔχει. μέλος δ' ἐστί (713.7–14). The sillos is also related to the parody (παρῳδία) by Diogenes Laertius (9.111) in his life of Timon of Phlius. On the parody, see Egert Pöhlmann, "ΠΑΡΩΙΔΙΑ," *Glotta* 50 (1972): 144–56.

[249] Encomia, fr. 125 + 126 (91 + 92): … τόν ῥα Τέρπανδρός ποθ' ὁ Λέσβιος εὗρεν | πρῶτος ἐν δείπνοισι Λυδῶν | ψαλμὸν ἀντίφθογγον ὑψηλᾶς ἀκούων πηκτίδος … | μηδ' ἀμαύρου πέρψιν ἐν βίῳ· πολύ τοι | φέρτιστον ἀνδρὶ τερπνὸς αἰών (Maehler, pt. 2). Translation adapted from Sandys, *Odes of Pindar*, 585–87.

[250] Alcaeus was born sometime prior to 620 B.C.E.; Anacreon flourished in the sixth century B.C.E.; and Praxilla flourished around 450 B.C.E.

Athenaeus suggests that the set of twenty-five skolia could be viewed as representing a single performance. Indeed, after the first seven songs, the last of which is attributed to Simonides or Epicharmus, Athenaeus records a short interruption during which the guests comment on the song and one quotes a parody of it by Anaxandrides; the songs then resume. This may well represent the free and convivial manner in which the skolia were performed.[251]

The first four skolia—each of which is based on a four-line verse—are addressed to Athena, Demeter, Leto, and Pan. The third is typical:

> In Delos of yore did Leto bear children twain, Phoebus the golden-haired, Lord Apollo, and Huntress Artemis shooter of deer, who holdeth so great sway over women.[252]

The fifth skolion is imperfectly preserved but suggests a paean to Athena. The sixth and seventh skolia convey characteristic maxims of life. The sixth, for example, states:

> Would it were possible to part every breast and so read the mind within, and then closing it up believe beyond all doubt the man is a friend.[253]

On the basis of testimony in other sources,[254] skolia 10–13 can be combined to form a part of Callistratus's "Song of Harmodius," one of the skolia specifically mentioned by the scholiast to Plato's *Gorgias* 451e as well as Aristophanes in *Vespae* (1225) and *Acharnenses* (978–80 and 1093). Athenaeus's arrangement of the text into four separate pieces provides a clear example of the way in which the verses of a traditional song could be passed from guest to guest. The text itself employs a constant measure and refrains. The first two lines of the first verse are repeated in the third verse, and the last two lines of the first verse are nearly repeated in the fourth verse. All this suggests a simple repetitive melody that would be easy for a group of symposiasts to pass from one person to the next.

---

[251] Athenaeus *Deipnosophistae* 15.49–50 (693f–696a [Kaibel 3:535–41). The skolia are conveniently arranged and translated (although with a somewhat different numbering) in *Lyra Graeca,* 3:560–73 (cf. *Greek Lyric,* 5:276–97).

[252] Ἐν Δήλῳ ποτ' ἔτικτε παῖδε Λατώ, | Φοῖβον χρυσοκόμαν, ἄνακτ' Ἀπόλλω, | ἐλαφηβόλον τ' ἀγροτέραν | Ἄρτεμιν, ἃ γυναικῶν μέγ' ἔχει κράτος (*Lyra Graeca,* 3:562–63; *Greek Lyric,* 5:280–81 [cf. Kaibel 3:536]).

[253] Εἴθ' ἐξῆν ὁποιός τις ἦν ἕκαστος | τὸ στῆθος διελόντ' ἔπειτα τὸν νοῦν | ἐσιδόντα, κλείσαντα πάλιν, | ἄνδρα φίλον νομίζειν ἀδόλῳ φρενί (*Lyra Graeca,* 3:564–65; *Greek Lyric,* 5:282–83 [cf. Kaibel 3:537]).

[254] See *Lyra Graeca,* 3:567; *Greek Lyric,* 5:285.

I'll carry my sword in a myrtle-branch,
Like Harmodius and Aristogeiton,
When they slew the tyrant
And made Athens free.

Dearest Harmodius, I know you are not dead
Because they say you are in the Islands of the Blest,
Where also are swift-footed Achilles
And brave Diomedes, son of Tydeus.

I'll carry my sword in a myrtle-branch,
Like Harmodius and Aristogeiton,
When at the feast of Athena
They killed the tyrant Hipparchus.

Your fame shall live in the earth forever
Dearest Harmodius and Aristogeiton
Because they slew the tyrant
And made Athens free.[255]

The remaining skolia, some of which consist of only two lines, represent a mixture of references to gods and heros, maxims, and sentiment. As might be expected, musical references occur only infrequently, while convivial references are more common. The seventeenth and twenty-third skolia are characteristic:

> O would I might become a pretty ivory lyre, and pretty lads might take me with them to Dionysus's choral dance.

and

> If good men deserve a drink, servant, forget thou not to pour one out for Cedon.[256]

---

[255] ἐν μύρτου κλαδὶ τὸ ξίφος φορήσω, | ὥσπερ Ἁρμόδιος κ' Ἀριστογείτων, | ὅτε τὸν τύραννον κτανέτην | ἰσονόμους τ' Ἀθήνας ἐποιησάτην. | φίλταθ' Ἁρμόδι', οὔ τί που τέθνηκας· | νήσοις δ' ἐν μακάρων σέ φασιν εἶναι | ἵνα περ ποδώκη τ' Ἀχιλέα | Τυδεΐδην τ' ἔτ' ἐσθλὸν Διομήδεα. | ἐν μύρτου κλαδὶ τὸ ξίφος φορήσω, | ὥσπερ Ἁρμόδιος κ' Ἀριστογείτων, | ὅτ' Ἀθηναΐης ἐν θυσίαις | ἄνδρα τύραννον Ἵππαρχον ἐκαινέτην. | αἰεὶ σφῶν κλέος ἔσσεται κατ' αἶαν, | φίλταθ' Ἁρμόδιος κ' Ἀριστογείτων, | ὅτι τὸν τύραννον κτανέτην | ἰσονόμους τ' Ἀθήνας ἐποιησάτην (*Lyra Graeca,* 3:566; *Greek Lyric,* 5:284–87). Cf. Athenaeus *Deipnosophistae* 15.50 (695a–b [Kaibel 3:538–39]).

[256] Εἴθε λύρα καλὰ γενοίμαν ἐλεφαντίνα, | καί με καλοὶ παῖδες φέροιεν Διονύσιον ἐς χορόν (*Lyra Graeca,* 3:568–69; *Greek Lyric,* 5:288–89 [cf. Kaibel 3:539]);

Among the surviving musical fragments, one composition has been frequently described as a skolion: the famous Epitaph of Seikilos inscribed on a tombstone. Although this piece is short and simple in style, its context hardly suggests a skolion. Rather, the piece is an epigram, a short and simple verse commonly placed on grave stones and votive tablets. As noted above, the scholiast to Plato's *Gorgias* 451e makes an explicit association between the epigram and the skolion, and the confusion of modern scholarship on this composition is not surprising.

The Epitaph of Seikilos has had a checkered history. First brought to the attention of scholars in 1883, the tombstone formed a part of the De Jong Collection in Bourja near Smyrna (modern-day Izmir) until the burning of the city in September 1922, after which the column disappeared for thirty-five years. Its rediscovery was announced in 1957, and in 1966 it joined the collections of the National Museum in Copenhagen (Inv. 14897). A rubbing of the stone made shortly after its initial discovery shows that the tombstone then exhibited thirteen lines of text, with musical notation appearing above lines 6–11. Sometime prior to 1922, line 13 was destroyed when the bottom of the stone was ground off so that it could stand upright and serve as a pedestal for a flower vase![257]

The paleography of the inscription allows it to be securely dated to the first century C.E., and the first five lines of the inscription clearly identify the purpose of the column:

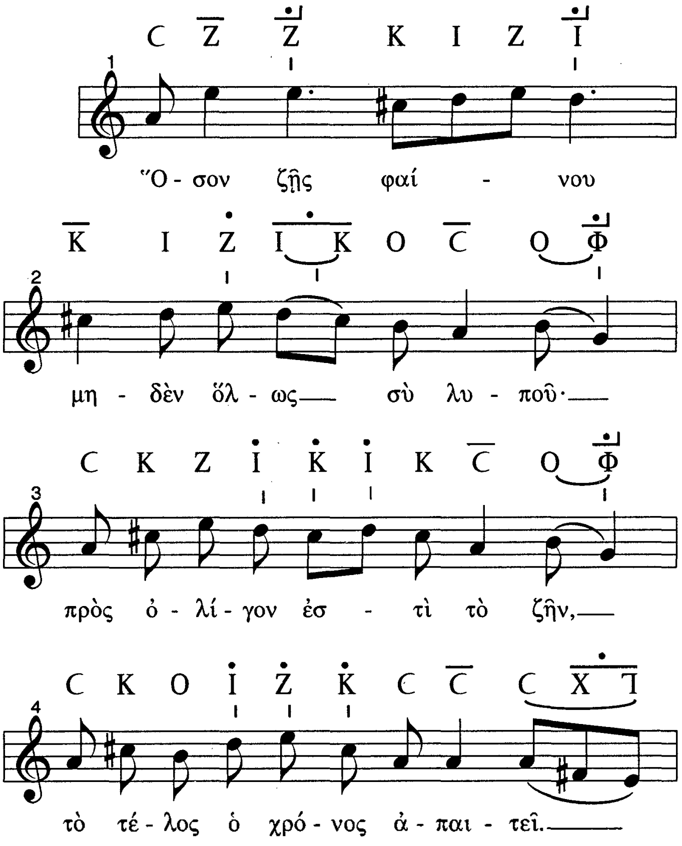
> I am a tombstone, an image. Seikilos placed me here as an everlasting sign of deathless remembrance.[258]

The epigram itself immediately follows, arranged in six lines on the column. The arrangement, however, is merely due to the exigencies of space; the composition is clearly constructed in four lines of iambic dimeter.

"Εγχει καὶ Κήδωνι, διάκονε, μηδ' ἐπιλήθου, | εἰ χρὴ τοῖς ἀγαθοῖς ἀνδράσιν οἰνοχοεῖν (*Lyra Graeca*, 3:570–71; *Greek Lyric*, 5:290–91 [cf. Kaibel 3:540]). In the twenty-third skolion (Edmonds 20), I have read "servant" for his "drawer."

[257] For a brief survey of the history of the stone, see Pöhlmann, *Denkmäler*, 56–57 (pictured in illustrations 15–16). The rubbing was published in Théodore Reinach, "La musique du nouvel hymne de Delphes," *Bulletin de correspondance hellénique* 18 (1894): 363–89; and idem, *La musique grecque*, 171.

[258] Εἰκὼν ἡ λίθος | εἰμί· τίθησι μὲ | Σείκιλος ἔνθα | μνήμης ἀθανάτου | σῆμα πολυχρόνιον (Pöhlmann, *Denkmäler*, 54).


C Z Z K I Z I
1
Ὅ - σον ζῇς φαί - νου
K I Z I K O C O Φ
2
μη - δὲν ὅλ - ως σὺ λυ - ποῦ·
C K Z I K I K C O Φ
3
πρὸς ὀ - λί - γον ἐσ - τὶ τὸ ζῆν,
C K O I Z K C C C X ⅂
4
τὸ τέ - λος ὁ χρό - νος ἀ - παι - τεῖ.

Like the other fragments discussed in this chapter, the Epitaph of Seikilos exhibits a number of dichronic (e.g., the penultimate syllable in line 2) and common syllables that could be ambiguous apart from the musical setting. But unlike the other pieces, this composition features clear rhythmic notation throughout: syllables that would already be long by position or nature are often still given a diseme to insure the proper duration, syllables that would be short in the text (e.g., the penultimate syllable in line 3) are made long by the music, and the value of every ambiguous syllable is made clear. Trisemes appear at the end of each line as well as in the middle of the first line, in each case falling on a diphthong or a long vowel with a circumflex accent. These long and full sounds are thereby given extra musical emphasis, especially as they always follow a long musical duration, and this musical extension of the long syllables certainly recalls Dionysius of Halicarnassus's observation that long and short syllables have varying lengths: "some are longer than longs and some shorter than shorts."[259] In addition to the clarity of the rhythmic notation, stigmai mark out every foot; most of them fall on disemes or trisemes, but in lines 3–4 where the second half of the first foot is separated into three short chronoi, each receives a stigme, exactly as was seen in the *Orestes* papyrus.[260]

There are no modulations in the Epitaph, and the notation clearly indicates the diatonic Iastian tonos. The melodic design of these few lines makes considerable use of patterns of melic composition described by such later theorists as Cleonides and Aristides Quintilianus, including ascending and descending sequence (ἀγωγή), which is particularly noteworthy in line 2, and succession (πλοκή), which appears at the end of line 3 and the beginning of line 4.[261] As a whole, the composition quite consciously employs the range of an octave, with strong polar points on e', a', and e''. Moreover, lines 2–4 are related by obvious motivic affinities, and the ascending and descending arpeggiation of the full octave in line 4 provides a strong cadential balance to the ascending open fifth in line 1.

In view of its relatively late date, it seems reasonable to suppose that this piece may have been deliberately composed with an eye towards the theoretical principles articulated by theorists such as Cleonides or perhaps Ptolemy, especially since the piece fits perfectly within his Phrygian tonos.[262] In any case, the simple but perfectly balanced and controlled melody seems well suited to epigrammatic nature of the text:

As long as you live, shine
Grieve you not at all
Life is of brief duration
Time demands its end.[263]

---

[259] ἀλλὰ καὶ μακρότεραί τινές εἰσι τῶν μακρῶν καὶ βραχύτεραι τῶν βραχειῶν (Roberts 152.1–2).

[260] See p. 120 *supra*. For fuller analyses of this piece, rhythmic and melodic, see Mathiesen, "Rhythm and Meter," 176–78; and Jon Solomon, "The Seikilos Inscription: A Theoretical Analysis," *American Journal of Philology* 107 (1986): 455–79.

[261] These compositional devices are described in Cleonides *Harmonica introductio* 14; Aristides Quintilianus *De musica* 1.12. See chapter 5, pp. 389–90, and chapter 6, p. 537 *infra*.

[262] See chapter 5, p. 465 *infra*.

[263] Ὅσον ζῇς, φαίνου | μηδὲν ὅλως σὺ λυποῦ | πρὸς ὀλίγον ἐστὶ τὸ ζῆν | τὸ τέλος ὁ χρόνος ἀπαιτεῖ (Pöhlmann, *Denkmäler*, 54).

The precise meaning of the lines (12–13) following the epigram remains uncertain—especially since line 13 no longer survives on the stone—, but as the first word is clearly Seikilos's name once again, the lines may have been intended to identify Seikilos as the author of the epigram.[264]

Miscellaneous types, military music, and folk song

In addition to the many specific musical types described by ancient sources and preserved to a greater or lesser degree in the remains of Greek poetry, there are passing descriptions of various miscellaneous compositions: love songs; work songs; military music; songs praying for a specific gift from a specific divinity, describing a particular deed of some individual, or recalling scenes or experiences of a voyage; songs written by poets sent on a journey; songs with a moral message; songs describing the fields and the seasons of planting and harvest; and songs conveying advice on some matter or another.[265] Because much of this material sprung naturally from the people and tended to be associated with individual events or occasions, little of it survives beyond the general recollections of writers such as Athenaeus, Pollux, Pausanias, and Plutarch.

In a few cases, however, some of the musico-poetic types already considered could also be classed among these miscellaneous types. Proclus's *Chrestomathia*, for example, refers to the hymenaios and epithalamion as love songs, and Athenaeus, on the authority of Clearchus, considers much of the poetry of Sappho, Anacreon, Archilochus, and Asopodorus to be love songs

---

[264] Roderick Beaton ("Modes and Roads: Factors of Change and Continuity in Greek Musical Tradition," *The Annual of the British School at Athens* 75 [1980]: 1–11), however, regards the Epitaph of Seikilos as the earliest surviving example of Greek folk music and observes (p. 10) that it is characteristic of the "gnomic, fatalistic and often lugubrious couplets sung by both the Greeks and Turks of this area still."

[265] Most of these are listed in Proclus's *Chrestomathia*: Εὐκτικὰ δὲ μέλη ἐγράφετο τοῖς αἰτουμένοις τι παρὰ θεοῦ γενέσθαι. πραγματικὰ δέ, ἅ τινων περιεῖχε πράξεις. ἐμπορικὰ δέ, ὅσα κατὰ τὰς ἀποδημίας καὶ ἐμπορείας ἐπιδεικνύμενά τισιν ἐγράφη. καὶ ἀποστολικὰ δέ, ὅσα διαπεμπόμενοι πρός τινας ἐποίουν. τὰ δὲ γνωμολογικὰ δῆλον ὅτι παραίνεσιν ἠθῶν ἔχει, καὶ τὰ γεωργικὰ δὲ χώρας καὶ φυτῶν καιροὺς καὶ ἐπιμελείας. καὶ τὰ ἐπισταλτικὰ δέ, ὅσα κατ' ἐντολὰς πρός τινας ποιοῦντες διέπεμπον (Bekker 322a30–38).

(ἐρωτικὰ ᾄσματα).[266] In Book XV of the *Deipnosophistae,* Athenaeus describes the game of kottabos (κότταβος), in which symposiasts flicked the dregs of their wine into a metal basin. Athenaeus refers to a set of love songs by Bacchylides and quotes two short lines that illuminate the meaning of the term ἀγκύλη (bend), which was associated with kottabos:

> When she lifts her white arm
> And throws from the bend
> At the bidding of these young men.[267]

Athenaeus is unsure whether the term refers to a certain bend of the wrist used in the flicking motion or a special type of drinking cup. In any event, Athenaeus counts Bacchylides's song, which describes kottabos, as a love song.

In both Book XIV and XV of the *Deipnosophistae,* Athenaeus refers to "Locrian songs," true folk songs on subjects of love. His short example tells about lovers' fear of discovery:

> O what is wrong? I beg you, do not betray us. Rise and go before he comes, or he'll do some great harm to you and thrice-pitiable me. E'en now 'tis day; see you not the light through the window?[268]

Athenaeus adds that such songs were heard all over Phoenicia, and indeed, songs with this same theme abound in later folk poetry. Elsewhere, on the authority of Clearchus and Aristoxenus, Athenaeus describes three pastoral love songs, Nomion, Kalukë, and Harpalukë. Nomion tells the story of Eriphanis's unrequited love for the hunter Menalcas; Kalukë, which Aristoxenus ascribes to Stesichorus, is a song about a virtuous maiden who throws herself from a cliff in despair when her love is rejected by the youth Euathlus; and Harpalukë is a nearly identical story with different characters.[269]

In the Plutarchean *De musica,* Soterichus, speaking of the proper modes (τρόποι) for the various musical types, observes that the Dorian was used not only for tragic lamentation (τραγικὸς οἶκτος) but also for love songs.[270] It is impossible, however, to know whether he is speaking of formal love songs composed by the lyric poets or true folk song.

---

[266] Proclus *Chrestomathia* (Bekker 321a15–28); Athenaeus *Deipnosophistae* 14.43 (639a [Kaibel 3:410.20–411.5]). Asopodorus is otherwise unknown.

[267] *Deipnosophistae* 15.5 (667c): εὖτε | τὴν ἀπ' ἀγκύλης ἵησι | τοῖσδε τοῖς νεανίαις | λευκὸν ἀντείνασα πῆχυν (*Lyra Graeca,* 3:214; *Greek Lyric,* 4:270 [cf. Kaibel 3:475.6–7]).

[268] *Deipnosophistae* 15.53 (697b–c): Ὦ τί πάσχεις; μὴ προδῷς ἄμμ', ἱκετεύω· | πρὶν καὶ μολεῖν κεῖνον, ἀνίστω, μὴ κακὸν | μέγα ⟨σε⟩ ποιήσῃ κἀμὲ τὴν δειλάκραν. | ἁμέρα καὶ δή· τὸ φῶς διὰ τᾶς θυρίδος οὐκ εἰσορῇς; (*Lyra Graeca,* 3:546–47; *Greek Lyric,* 5:240 [cf. Kaibel 3:544]).

[269] Athenaeus *Deipnosophistae* 14.11 (619c–e [Kaibel 3:365.21–366.21]).

The Greeks employed all sorts of music to lighten the burdens of labor or, in some cases, to coordinate military activities. Pausanias's *Graeciae descriptio* (4.27.7), for example, refers to masons working to the sound of the aulos and the mele of Sacadas and Pronomus. In Book II of his *De musica,* Aristides Quintilianus states that

> ... wars and marches are both aroused and composed through music. It makes sailing and rowing and the most difficult of the handicrafts not burdensome by providing an encouragement for the work.[271]

A bit later (2.6), he observes that Roman armies used the salpinx to play specific mele corresponding to specific military movements. There was a melos for attacking by line, one for retreating, special mele for pivoting to the left or right, and so on. In his *Adversus musicos,* Sextus Empiricus, too, includes salpinx melos among examples of the utilitarian functions of music, but he sees it merely as a distraction:

> That the Spartans do battle to the aulos and the lyre is proof of what was said a short while before [i.e., that music is distracting], but not of music being useful for life. Just as those who bear burdens or row or do some other of the toilsome works beat time in order to draw the mind away from the trial of the work, so also those who use auloi and salpinxes in battles contrived this not because there was a certain melos stimulating to the heart and this melos was the cause of manly courage but because they were eager to draw themselves away from the agony and disorder ....[272]

---

[270] Plutarch *De musica* 1136f–1137a (Ziegler 14.18–19).

[271] πόλεμοι δὲ καὶ ὁδῶν πορεῖαι διὰ μουσικῆς ἐγείρονταί τε καὶ καθίστανται· ναυτιλίας τε καὶ εἰρεσίας καὶ τὰ χαλεπώτατα τῶν χειρωνακτικῶν ἔργων ἀνεπαχθῆ ποιεῖ τῶν πόνων γινομένη παραμύθιον (W.-I. 57.25–29). Mathiesen, *AQ on Music,* 120.

[272] Τό τε τοὺς Σπαρτιάτας πρὸς αὐλὸν καὶ λύραν πολεμεῖν τοῦ μικρῷ πρότερον εἰρημένου τεκμήριόν ἐστιν, ἀλλ' οὐχὶ τοῦ βιωφελῆ τυγχάνειν τὴν μουσικήν. καθάπερ δ' οἱ ἀχθοφοροῦντες ἢ ἐρέσσοντες ἢ ἄλλο τι τῶν ἐπιπόνων δρῶντες ἔργων κελεύουσιν εἰς τὸ ἀνθέλκειν τὸν νοῦν ἀπὸ τῆς κατὰ τὸ ἔργον βασάνου, οὕτω καὶ αὐλοῖς ἢ σάλπιγξιν ἐν πολεμοῖς χρώμενοι οὐ διὰ τὸ ἔχειν τι τῆς διανοίας ἐπεγερτικὸν τὸ μέλος καὶ ἀνδρικοῦ λήματος αἴτιον ὑπάρχειν τοῦτο ἐμηχάνησαντο, ἀλλ' ἀπὸ τῆς ἀγωνίας καὶ ταραχῆς ἀνθέλκειν ἑαυτοὺς σπουδάσαντες (Greaves 144–45). Sextus Empiricus's observations are confirmed by Aristophanes *Ranae* 1073 and *Vespae* 909, Philodemus *De musica* (*Philodemi De musica librorum quae*

This role of the salpinx, or some similar instrument, is attested not only in literary sources[273] but also in a fragmentary painting on a black-figure epinetron, probably dating from the fifth century B.C.E. Three fragments survive showing the preparation for battle and the battle itself. On one of these, an Amazon plays a salpinx, and around her head, the solmization syllables το, το, τε, το, and τη appear, perhaps suggesting the fanfare-like pattern c', c', g, c' e'.[274]

Salpinx signals were not the only kind of military music. Marching songs are also described by Thucydides (*Historiae* 5.69), Dio Chrysostomus (*Orationes* 2.59), Polybius (*Historiae* 4.20.12), and others. Book XIV of Athenaeus's *Deipnosophistae* refers to the Spartan marching songs, the embateria mele (ἐμβατήρια μέλη) or enoplia (ἐνόπλια), and Plutarch in his *Instituta Laconica* observes that marching rhythms (ἐμβατήριοι ῥυθμοί) incited the soldiers to bravery and contempt for death.[275] The six lines of Tyrtaeus's embaterion quoted by Dio Chrysostomus suggest that the embateria were anapestic:

> Forward, ye sons of sires that dwelt in a town of brave men; hold in your left hand the protecting shield and cast the spear stoutly before you, with no thought for your life, for to spare that was never Sparta's way.[276]

---

exstant, ed. Ioannes Kemke [Leipzig: B. G. Teubner, 1884], 71–72.8), and Quintilian *Institutio oratoria* 1.10.16.

[273] See, for example, *Ilias* 18.219–21, Thucydides *Historiae* 5.70 and 6.69, and Xenophon *Anabasis* 4.3.29.

[274] The fragments are from Epinetron 907 of the Museum at Eleusis. The specific solmization syllables are attested by Aristides Quintilianus *De Musica* 2.14 and 3.21 (see Mathiesen, *AQ on Music*, 33–34, 143–44; and Charles-Emile Ruelle, "La solmisation chez les anciens grecs," *Sammelbände der Internationalen Musikgesellschaft* 9 [1907–8]: 512–30) and by Bellermann's Anonymous 3.77 (Najock 126–29). For a description of the musical aspects of the epinetron, see Annie Bélis, "Un nouveau document musical," *Bulletin de correspondance hellénique* 108 (1984): 99–109.

[275] *Deipnosophistae* 14.29: πολεμικοὶ δ' εἰσὶν οἱ Λάκωνες, ὧν καὶ οἱ υἱοὶ τὰ ἐμβατήρια μέλη ἀναλαμβάνουσιν, ἅπερ καὶ ἐνόπλια καλεῖται (630f [Kaibel 3:391.23–25]); *Instituta Laconica* 16: καὶ οἱ ἐμβατήριοι δὲ ῥυθμοὶ παρορμητικοὶ πρὸς ἀνδρείαν καὶ θαρραλεότητα καὶ ὑπερφρόνησιν θανάτου, οἷς ἐχρῶντο ἔν τε χοροῖς καὶ πρὸς αὐλὸν ἐπάγοντες τοῖς πολεμίοις (238b [*Plutarch's Moralia*, 3:434]). Sextus Empiricus, of course, disagrees with this assessment.

[276] Ἄγετ', ὦ Σπάρτας εὐάνδρω | κῶροι πατέρων πολιατᾶν, | λαιᾷ μὲν ἴτυν προβάλεσθε, | δόρυ δ' εὐτόλμως βάλετ' ἄντα, | μὴ φειδόμενοι τᾶς ζωᾶς· | οὐ γὰρ πάτριον τᾷ Σπάρτᾳ (*Lyra Graeca*, 3:534–35; *Greek Lyric*, 5:242).

Hephaestion provides another example, which he uses to illustrate the way in which anapestic verse might use a spondaic close:

> Forward, ye armed children of Sparta, to the movement of Ares.[277]

The Plutarchean Soterichus refers to an additional song, the Castorian melos, which was played on the aulos as the Spartans marched into battle. He adds that the Cretans preferred to march to the accompaniment of the lyre, while "others" (most likely referring to the Romans) used the salpinx.[278]

Although more specific detail about military music is recorded in the literary sources, the names of types of songs used to accompany various mundane activities and a few fragments are also preserved. Athenaeus, drawing on a number of writers—Tryphon, Semus the Delian, Telecleides, Crates, and so on—, refers to the himaios (ἱμαῖος), a milling song; the elinos (ἔλινος), a weaving song; the ioulos (ἴουλος), which may be a baking song, another weaving song, or a spinning song; the katabaukalesis (καταβαυκάλησις), a lullaby; the aletis (ἀλῆτις), a wandering song; the lituerses (λιτυέρσης), a reaping song; the boukoliasmos (βουκολιασμός), a herding song; and the olophurmos (ὀλοφυρμός) and ialemos (ἰάλεμος), mourning songs.[279] Pollux's *Onomasticon* (4.53–56) not only cites many of the same names but also refers to aulos music intended to accompany various labors: the epilenion aulema (ἐπιλήνιον αὔλημα) for the treading of grapes and unnamed compositions for shepherding, winnowing, and rowing.

A few fragments of these folk songs will illustrate their style.[280] Plutarch's *Septem sapientium convivium* (157e) preserves an example of a milling song:

> Grind, mill, grind;
> Yes, for Pittacus used to grind

---

[277] *Ench.* 8: Ἄγετ', ὦ Σπάρτας ἔνοπλοι κῶροι, ποτὶ τὰν Ἄρεως κίνασιν (Consbruch 26).

[278] ... Λακεδαιμόνιοι, παρ' οἷς τὸ καλούμενον Καστόρειον ηὐλεῖτο μέλος ὁπότε τοῖς πολεμίοις ἐν κόσμῳ προσῄεσαν μαχεσόμενοι. οἱ δὲ καὶ πρὸς λύραν ἐποίουν τὴν πρόσοδον τὴν πρὸς τοὺς ἐναντίους, καθάπερ ἱστοροῦνται μέχρι πολλοῦ χρήσασθαι τῷ τρόπῳ τούτῳ τῆς ἐπὶ τοὺς πολεμικοὺς κινδύνους ἐξόδου Κρῆτες. οἱ δ' ἔτι καὶ καθ' ἡμᾶς σάλπιγξι διατελοῦσι χρώμενοι (1140c [Ziegler 22.11–17]).

[279] Athenaeus *Deipnosophistae* 14.10 (618c–619c [Kaibel 3:363.24–365.21]).

[280] The group of folk songs and the commentary accompanying them in the sources are conveniently collected (and rather freely translated) in *Lyra Graeca*, 3:488–548; cf. *Greek Lyric*, 5:232–69.

King of great Mytilene.[281]

Book VIII of Athenaeus's *Deipnosophistae* records an extended begging song, the Swallow-Song, which was sung in Rhodes:

Come! come! the swallow is here!
She brings a good season,
She brings a good year.
White on her breast,
And black on her crest.
Roll out a fruit-cake,
From the cheese-house,
A beaker of wine,
A basket of cheese.
Breads and porridge
The swallow does not push away.
Whether we go depends on what we take from you,
If only you will give us something; but if not, we won't go.
Shall we carry off your door or your lintel as well,
Or your wife that is seated within?
She is small and we will easily carry her off.
If you would carry us a little,
He will carry you a lot.
Open, open the door for the swallow,
For we are not old men, but children.[282]

And Book XIV preserves the text to a little dance called "Flowers":

Where are my roses, where are my violets,
And where is my fine parsley?
Here are your roses, here are your violets
And here is your fine parsley.[283]

This particular song, which is in dactylic rhythm, has the added but somewhat unusual feature of rhyme at the end of every interior phrase: ῥόδα, ἴα, and σέλινα.

---

[281] ἄλει, μύλα, ἄλει· | καὶ γὰρ Πιττακὸς ἄλει | μεγάλας Μυτιλάνας βασιλεύων (text and translation from *Plutarch's Moralia,* 2:410–11).

[282] *Deipnosophistae* 8.60 (360c–d): ἦλθ', ἦλθε χελιδὼν | καλὰς ὥρας ἄγουσα, | καλοὺς ἐνιαυτούς, | ἐπὶ γαστέρα λευκά, | ἐπὶ νῶτα μέλαινα. | παλάθαν σὺ προκύκλει | ἐκ πίονος οἴκου | οἴνου τε δέπαστρον | τυροῦ τε κάνυστρον. | καὶ πυρῶν | ἁ χελιδὼν καὶ λεκιθίταν | οὐκ ἀπωθεῖται. | πότερ' ἀπίωμες ἢ λαβώμεθα; | εἰ μέν τι δώσεις· εἰ δὲ μή, οὐκ ἐάσομεν, | ἢ τὰν θύραν φέρωμες ἢ θοὐπέρθυρον | ἢ τὰν γυναῖκα τὰν ἔσω καθημέναν· | μικρὰ μέν ἐστι, ῥᾳδίως νιν οἴσομες. | ἂν δὴ φέρῃς τι, | μέγα δή τι φέροιο. | ἄνοιγ', ἄνοιγε τὰν θύραν χελιδόνι· | οὐ γὰρ γέροντές ἐσμεν, ἀλλὰ παιδία (Kaibel 2:288–89 [cf. *Lyra Graeca,* 3:526, 528; *Greek Lyric,* 5:232–35]).

[283] *Deipnosophistae* 14.27 (629e): ποῦ μοι τὰ ῥόδα, ποῦ μοι τὰ ἴα, ποῦ μοι τὰ καλὰ σέλινα; | ταδὶ τὰ ῥόδα, ταδὶ τὰ ἴα, ταδὶ τὰ καλὰ σέλινα (Kaibel 3:389).

Although a full and complete picture of the ancient Greek musico-poetic types cannot be formed, enough detail survives in the poetic texts, early commentaries, iconography, and notated musical fragments to reveal a tremendous musical sophistication, variety, and vitality. Grander and more complex types such as the hymn, paean, prosodion, and dithyramb played important roles in religious and civic life. The nomos, originally a form associated with venerable tradition, became the particular vehicle for musical innovation and the development of the virtuoso. Likewise, the epinikion provided a form in which important personal and human victories could be memorialized to inspire future generations. The relationship of dance and music was especially prominent in the dithyramb, partheneion, and hyporcheme, but the most complete union of music, text, movement, and costume was developed in the drama, which formed a centerpiece of the civic and religious festivals of the Greeks. Everyday social life, too, was supported by wedding and funeral music, love songs, work songs, banquet songs, and the like. In each piece, whether formal and complex or simple and folklike, the musicians could draw on a wealth of tradition, a powerful and innately sonorous language, and virtually limitless combinations of rhythms, meters, tonoi, inflections of melodic scale, gesture, and dance.

Much of this music was accompanied by a variety of musical instruments. Although some of these have been noted along the way, they have remained in the background of the picture of musical life in ancient Greece developed to this point. The next chapter brings them to the foreground.

BLANK PAGE

III

Musical Instruments

Musical instruments appealed to the Greeks at least as much as they did to other early musical cultures, although ancient Greek music was fundamentally vocal—and hence literary—in character. The musico-poetic types examined in the previous chapter were colored and brightened by the sounds of an array of instruments that could produce varied timbres ranging from sharp percussive attacks to long sustained melodic lines and from imprecise or indifferent noise to the subtlest shading of pitch. The Greeks employed instruments from the four traditional Hornbostel-Sachs classifications—idiophones, aerophones, membranophones, and chordophones[1]—and detailed descriptions survive in the literary sources. Moreover, the beauty of musical instruments as objects appealed to Greek painters and sculptors. Red- and black-figure vase painters portrayed countless scenes of Greeks of all classes, as well as the gods themselves, engaged in playing musical instruments. Sculptors portrayed musical instruments in terra cotta statuary and on gemstones and low reliefs. In addition to all this literary and iconographic evidence, a remarkable number of instruments survive as archaeological artifacts. These remains, together with the other evidence, make it possible to reconstruct individual instruments and experiment with them to discover characteristics of timbre, pitch, tuning, and performance practice. In sum, a considerable amount of material is available from which to form a rather complete picture of the Greeks' musical instruments and their use.

Both Plato and Aristotle recognized the pervasiveness of instruments in their musical culture, but as might be expected, they regarded instrumental music as inferior to vocal music. In *Respublica* 3.10, Plato extends his conservative view of music to include instruments. He considers it unnecessary for the city to have instruments capable of producing many different pitches (polychordia) in every harmonia (panharmonia), and the aulos, with its ability to produce infinitely shaded pitches, is specifically excluded:

---

[1] A brief description of these classifications appears in Sachs, *History of Musical Instruments*, 454–67.

> "Then," I said, "we have no need of polychordia and panharmonia in our songs and mele." "It does not seem so to me," he said. "Then we shall not maintain makers of trigona and pektides and every other instrument that is polychordic and polyharmonious." "We think not." "What then? Will aulos-makers and auletes be allowed in the city, or is this not the most polychordic and is it not the case that the panharmonious instruments themselves imitate the aulos?" "Surely that is evident," he said. "The lyre and the kithara remain for you," I said.[2]

In *De anima* 2.8, Aristotle distinguishes between sound (ψόφος), which is produced by musical instruments, and voice (φωνή), which is human or animal: voices are possessed only by creatures with souls.[3] Nevertheless, the Aristotelian *Problemata* and *De audibilibus* are quite interested in musical instruments. In their interrogatory form, *Problemata* 19.9 observes that a song gives more pleasure if it is sung to the accompaniment of an aulos or lyre, and *Problemata* 19.10 states that it is more pleasant to listen to the sound of instruments than to humming. The little treatise *De audibilibus*, which will be discussed later in this chapter, contains a wealth of detail about the characteristics of auloi, aulos reeds, and musical sound in general.

Although he quite often repeats the positions taken by Plato in the *Respublica* or *Leges*, Aristides Quintilianus candidly recognizes the popularity and importance of musical instruments in his own time. In the course of the second book of his *De musica*, he comments at length on the influence of music on behavior, and in section 16, he observes that musical instruments are called

---

[2] Οὐκ ἄρα, ἦν δ' ἐγώ, πολυχορδίας γε οὐδὲ παναρμονίου ἡμῖν δεήσει ἐν ταῖς ᾠδαῖς τε καὶ μέλεσιν. Οὔ μοι, ἔφη, φαίνεται. Τριγώνων ἄρα καὶ πηκτίδων καὶ πάντων ὀργάνων, ὅσα πολύχορδα καὶ πολυαρμόνια, δημιουργοὺς οὐ θρέψομεν. Οὐ φαινόμεθα. Τί δέ; αὐλοποιοὺς ἢ αὐλητὰς παραδέξει εἰς τὴν πόλιν; ἢ οὐ τοῦτο πολυχορδότατον, καὶ αὐτὰ τὰ παναρμόνια αὐλοῦ τυγχάνει ὄντα μίμημα; Δῆλα δή, ἦ δ' ὅς. Λύρα δή σοι, ἦν δ' ἐγώ, καὶ κιθάρα λείπεται ... (399c–d). Cf. Plato *Leges* 3 (700a–701b).

[3] Porphyrius quotes this same passage in his commentary (Düring 7.8–19) on the first chapter of Claudius Ptolemy's *Harmonica*.

"instruments" (ὄργανα) because—like a pruning knife—they are used to do something. In the case of music, instruments enhance delight and strengthen music's power and effect. Aristides Quintilianus characterizes certain instruments—like most of the other musical elements—as masculine (such as the salpinx or the lyre), feminine (the Phrygian aulos or the sambuke), or medial. The final group is further subdivided into the relatively masculine (the Pythian aulos or the kithara "not much at variance with the lyre") and the relatively feminine (the choric aulos or kithara of many notes).[4] In the blending of these characteristics, music, as a mimetic art, gains its therapeutic power. Aristides Quintilianus then poses a rhetorical question: "Is there not more strongly born in those hearing these things a yearning to seek after the reason and to learn what coerces the soul to be so readily conquered by melody played on instruments?"[5]

The answer to the question evolves from analogies between musical instruments and the human body itself as the instrument of the soul. Aristides Quintilianus proposes that the human body is composed of membranes, sinews, and breath. In consequence, it has the capacity to respond through a kind of sympathetic resonance between the sinews and stringed instruments, the breath and wind instruments, and the membranes and percussion instruments, though he does not specifically draw the third of these analogies. Since the stringed instruments are especially associated with Apollo and Hermes, music played on these instruments is elevating, while the music of the aulos is merely pleasurable. Aristides Quintilianus recognizes, of course, that the aulos is sometimes associated with Athena, but he minimizes this association by noting that Athena threw away the auloi as not suitable for those desiring wisdom but only for those exhausted from labor. He also recalls the contest between Apollo and Marsyas as a way of establishing the music of the kithara and the lyre,

---

[4] Aristides Quintilianus is presumably distinguishing between a smaller kithara of perhaps seven strings and the large kithara associated with the instrumental virtuosi (see, for example, pp. 66–68 *supra*).

[5] Ἆρ' οὖν οὐ μᾶλλον τούτων ἐπακούουσιν ἐγγίνεται πόθος τήν τε αἰτίαν ἐπιζητῆσαι καὶ μαθεῖν τί τὸ τὴν ψυχὴν οὕτω προχείρως ἁλίσκεσθαι τῇ διὰ τῶν ὀργάνων μελῳδίᾳ καταναγκάζον; (W.-I. 86.8–11). See Mathiesen, *AQ on Music*, 149–51.

Apollo's instruments, as superior to the music of the aulos, Marsyas's instrument.[6]

Distinctions between the chordophones and aerophones—and among the instruments in each group—were simply assumed by most writers, no doubt because they seemed so obvious. Some definitions and classifications of instruments are preserved by Athenaeus, Pollux, and in other anecdotal and lexicographic works, but even there, the percussion instruments (idiophones and membranophones) receive little attention.[7] Percussion instruments were, however, seen by some writers as sharing at least one trait with the chordophones: both were struck in order to sound. If classification is based on performance technique, the idiophones, membranophones, and chordophones could indeed be considered a single class, distinct from the aerophones. Moreover, the chordophones and membranophones share a distinct physical characteristic that suggests they be grouped apart from the aerophones: both require tension for the instrument to sound.

Idiophones and Membranophones

The Greeks employed percussion instruments made of naturally sonorous materials that produced relatively indistinct pitches (idiophones), as well as percussion of more precise pitch produced by the resonance of a stretched membrane. All percussion instruments are capable of a wide dynamic range and various types of articulation, depending on the way in which they are struck. These instruments could certainly have been used to articulate the rhythmic and metric patterns of music, and in at least some cases, they must have been used to coordinate the performance by marking time. The percussion could easily sound multiple simultaneous patterns, such as the contrast between the rhythmic and metric patterns that frequently appears in the musical fragments, or a dynamic distinction between the arsis and thesis of various rhythmic feet.[8]

---

[6] Aristides Quintilianus *De musica* 2.18–19 (W.-I. 89.23–92.18). Mathiesen, *AQ on Music*, 154–57. This material is also surveyed in Margaret J. Kartomi, *On Concepts and Classifications of Musical Instruments* (Chicago: University of Chicago Press, 1990), 116–18. On the contest between Apollo and Marsyas, see pp. 178–82 *infra*.

[7] This does not mean, of course, that technical works on musical instruments never existed. Aristoxenus, for example, is credited with treatises on musical instruments in general and on the aulos, auletes, and the boring of auloi. See Wehrli, *Aristoxenos*, 34–35 (fr. 94–102).

The Greek idiophones include the krotala (κρόταλα), the kroupezai (κρούπεζαι) or kroupala (κρούπαλα), the kumbala (κύμβαλα) or krembala (κρέμβαλα), the seistron (σεῖστρον), and the rhombos (ῥόμβος).[9] The rhoptron (ῥόπτρον) is, in a sense, an idiophone, but like the other drums (τύμπανα), it is also a membranophone. The idiophones were used for a variety of purposes, while the membranophones were associated particularly with the rites of Dionysus and Cybele.

Krotala

Krotala are hollow blocks of some hard material, hinged with leather, held and clapped together in the hand. Modern scholarship commonly describes them as if they were castanets, but although they were played in a similar manner, the size and shape pictured in numerous vase paintings suggests a lower and more resonant sound, rather more like slapsticks than castanets. Literary descriptions, too, stress the similarity between hand-clapping and the clapping of the krotala. Herodotus's *Historia* 2.60 describes men and women singing and clapping—both with their hands and with the krotala—while they sail to the festival at Bubastis, and the *Suda* defines a single krotalon as a split reed, shaped in order to produce a clapping sound when shaken in the hands. It is not clear from the definition whether the sound is produced by a single krotalon or two krotala striking together, but the clapping sound, which provides articulation for the voice, is clearly described.[10]

---

[8] On the role of arsis and thesis in Greek rhythmic theory, see chapter 4, pp. 339–42. For examples of the contrast between the rhythmic and metric patterns of the musical fragments, see chapter 2 (and pp. 40–42, 45–46, 113, 117–20, and 149–50 *supra*).

[9] Bells were also important in ancient culture but primarily for magical, apotropaic, and signalling purposes. For an extensive survey, see Margaret A. Schatkin, "Idiophones of the Ancient World," *Jahrbuch für Antike und Christentum* 21 (1978): 147–72 (Greek, Roman, and early Christian cultures are treated on pp. 152–67).

[10] κρόταλον ἰδίως ὁ σχιζόμενος κάλαμος καὶ κατασκευαζόμενος ἐπίτηδες ὥστε ἠχεῖν, εἴ τις αὐτὸν δονοίη ταῖς χερσί, καθάπερ κρότον ἀποτελῶν. τρανὸς οὖν ἔσῃ, φησί, καὶ τὴν φωνὴν διηρθρωμένος καθάπερ τὰ κρόταλα, ἀντὶ τοῦ εὔγλωττος, εὔστομος (Bekker 629). Eustathius states in his twelfth-century commentary on

The krotala were quite strongly associated with mystery, excitement, and vigorous celebration. In his little treatise *De mirabilibus auscultationibus* (839a1–2), Aristotle recalls a haunted cave on the island of Lipara, where laughing is heard at night, accompanied by the sound of drums, kumbala, and krotala; and the Homeric hymn *In matrem deorum* calls on the Muse to celebrate Cybele with the sounds of krotala, drums, and auloi.

In addition to the literary references, krotala are frequently pictured in vase paintings being played by dancing women or satyrs and occasionally by young men. A pair of krotala is held in each hand, one usually pointing upwards, the other downwards. On occasion, both are held upwards. The association of the krotala with Dionysus means that they are frequently portrayed in the basins of drinking cups. One red-figure kylix painted by the Brygos painter (ca. 500–490 B.C.E.) shows Dionysus playing a barbitos accompanied by two dancing satyrs playing krotala (figure 12).[11] Another red-figure kylix, this one decorated by Epiktetos (ca. 500–490), shows a woman playing the krotala and dancing to the accompaniment of an aulete (figure 13).[12] In both paintings, the dancers appear in a characteristic pose with the head turned back over the right shoulder and one pair of krotala held above the head with the palm tending downwards, the other pair held at the level of the waist with the palm tending upwards. The satyrs' krotala are shown open, ready to be clapped, while the woman's krotala have already sounded. A third cup, by the Hermaios painter, shows a dancing man playing the krotala; once again, one pair points upwards and the other downwards. This particular figure can be further identified as an aulete by the aulos bag suspended from his left forearm.[13]

Ilias 11.160 that the krotala were made of shell or wood or copper, but he is probably conflating the krotala with the kumbala or krembala. See *Eustathii archiepiscopi Thessalonicensis commentarii ad Homeri Iliadem pertinentes,* ed. Marchinus van der Valk, 4 vols. (Leiden: Brill, 1971–87).

[11] Paris, Bibliothèque nationale, Cabinet des Médailles 576.

[12] London, British Museum E38.

[13] Cambridge, Fitzwilliam Museum GR 49.1864. The painting is probably contemporary with figures 12–13, or a little earlier. A picture appears in John Boardman, *Athenian Red Figure Vases: The Archaic Period* (London: Thames and Hudson, 1975), pl. 108. On the aulos bag, see p. 197 *infra.*

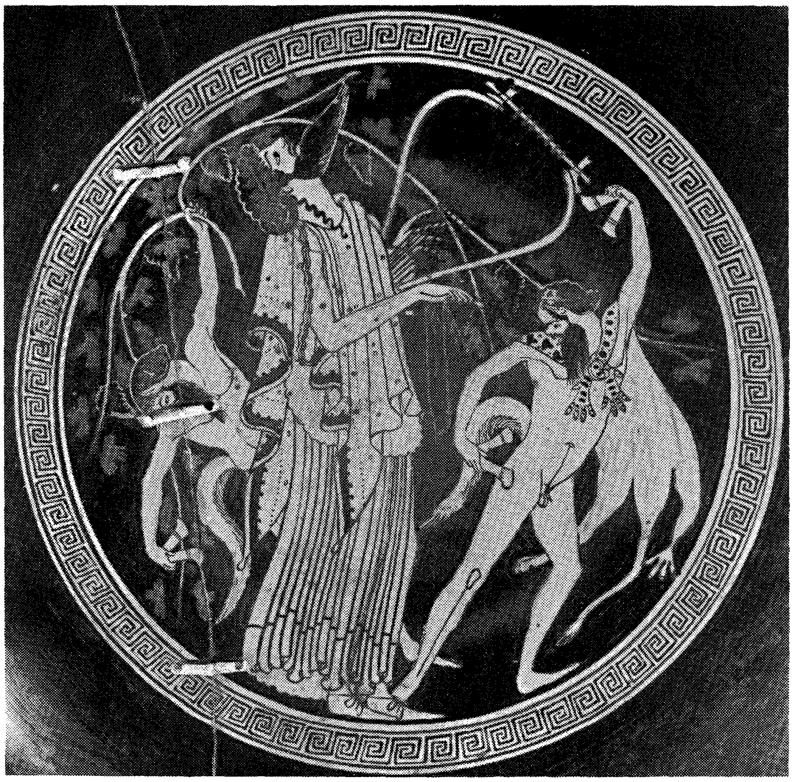


Figure 12.

cliché Bibliothèque nationale de France, Paris

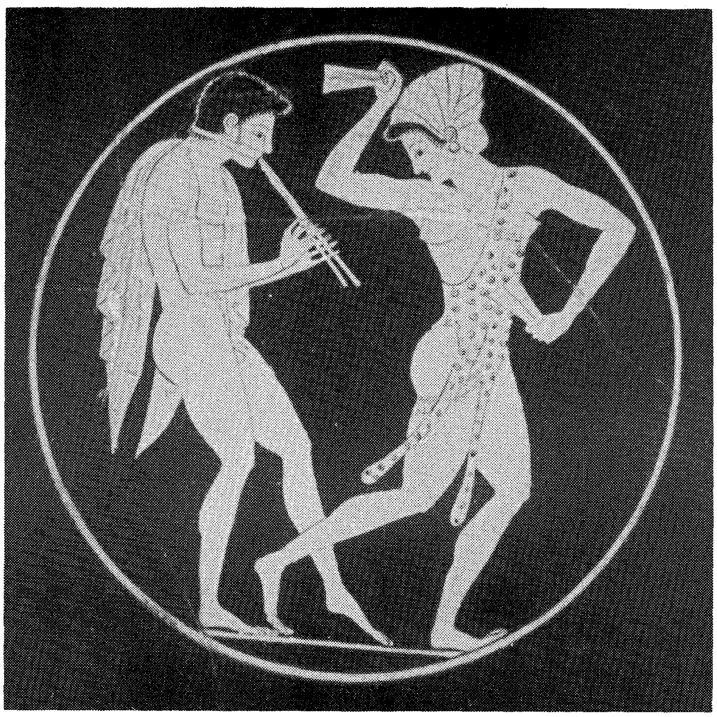


Figure 13.

Art Resource, NY

Painters are quite consistent in their representations of the proportions of the krotala: the blocks are approximately two-thirds the length of the performer's forearm. If an average forearm length of 18–25 cm is assumed, the krotala must have measured between 11.5 and 15 cm in length. Each krotalon appears to have had a sort of knob at the base, and in a pair, one knob could be grasped between the palm and the middle fingers of the hand, the other between the bent thumb and the palm. This finger-grip gave the performer considerable control over the instrument, and because the fingers wrapped around the knobs, the instrument could be played equally well pointing upwards, resting in the palm, or pointing downwards, suspended from the hand. The other fingers of the hand, extending on either side of the krotala, formed a kind of channel that kept the two halves in line. It was also possible for the krotala to be held by wrapping the entire hand around the base of the instrument. In this hand-grip, the control was more a matter of flexing the four fingers and the upper part of the palm against the thumb and the lower part of the palm. Both grips can been seen in figure 13, the more sensitive finger-grip in the dancer's right hand and a hand-grip in the dancer's left hand. In either case, the krotala must have been joined together at the base, probably by a leather hinge. The krotala seem to have been wider at the top than at the bottom, but the painters show considerable proportional variation in this dimension. Nevertheless, if the tops were approximately twice as wide as the bottoms, there would still be only 10° of declination from the vertical in 15-cm krotala, and such a proportion is sufficiently large in the upper part of the krotala to allow for resonance and sufficiently small at the bottom for the hand to grasp and control the blocks.[14]

Kroupezai or Kroupala

The group of performers in the larger musico-poetic types or in the drama required some basis for maintaining their ensemble. Although performers could watch or hear one another and could count the rhythms being sung or danced, some consistent measure was essential to insure a uniform tempo and provide a means for the performers—especially the dancers—to recover if they lost their place in the ensemble. In certain cases, this measure was provided by the clapping of the kroupezai,[15] which articulated a part of the rhythm or perhaps the meter. Some writers refer to the kroupezai as "kroupala" or "kroupeta," but the various forms all convey the same combination of "striking" and "foot." The kroupezai were essentially krotala worn on the foot and operated with the heel resting on the ground and the front part of the foot tapping up and down. Metal taps seem normally to have been attached to both of the inner faces of the kroupezai, and the sound of the instrument would have been harder, sharper, and more metallic than that of the krotala.

---

[14] These observations are based in part on my experiments with reproductions of krotala made in 1984 by my former student, David Hodges.

Pollux, in a section of the *Onomasticon* describing footwear, refers to several types of shoes, including the kothornos (κόθορνος), the high-topped buskin with thick soles worn by tragic actors; the arbule (ἀρβύλη), a sort of half-boot worn by hunters; the sandalon (σάνδαλον), a wooden-soled sandal worn by comic actors; and the kroupeza, "a wooden shoe, used to conduct the chorus." He adds: "Cratinas called the Boeotians 'kroupezai-carriers' because of their clapping at aulos music."[16] Elsewhere in the *Onomasticon*, Pollux mentions the various accoutrements of the aulete and refers to their shoes as "kroupezia," a diminutive of kroupezai. These references not only associate the aulos and the kroupezai but also suggest that it was the aulete who marked the time, at least in some cases. On the other hand, where they were present, the koruphaios and his assistants were responsible for the discipline of the ensemble and probably set the tempo.[17] The kroupezai may have been played by the koruphaios in certain choruses, while the aulete regulated the tempo in other musical forms, or the aulete may always have been responsible for percussive articulation.[18] In view of its date, it is also possible the *Onomasticon* is reflecting the change that took place as the aulete became more and more important; among other privileges, he perhaps assumed the kroupezai from the koruphaios.[19]

---

[15] Demosthenes *Meidias* 17 refers to the use of the kroupezion (the diminutive form of the term) in the training of the chorus. Cf. Lucian *De saltatione* 2, 63, and 83. The sounding beat was still being used by "conductors" in the eighteenth century C.E. to keep their ensembles together, and folk musicians frequently stamp time with their feet while playing or singing. The notion of a silent pulse maintained in the performers' and listeners' minds is modern.

[16] *Onomasticon* 7.87: ἡ δὲ κρούπεζα ξύλινον ὑπόδημα, πεποιημένον εἰς ἐνδόσιμον χοροῦ· κρουπεζοφόρους δ' εἶπε τοὺς Βοιωτοὺς Κρατῖνος διὰ τὰ ἐν αὐλητικῇ κρούματα (Bekker 295). The phrase translated here as "conduct" (εἰς ἐνδόσιμον) is used by other authors, where it seems to refer to instrumental music played prior to a song or a signal given for something to begin. Its other occurrence in Pollux (1.210) is in the context of the various signals used to call a horse and to make it stop or run. Here, to conduct the horse into a run, one strikes its belly with the foot and pulls up the neck with the bridle. Like the horse, the chorus is "conducted" by striking the kroupezai. Even in the other contexts, it may well be that the purpose of the instrumental music played before the song was to establish the proper rhythm and tempo, and thus its role, too, was to "conduct." Philostratus Junior *Imagines* 6 also refers to the musician who beats time on the ground with a sandal on the right foot.

A marble statue from the second century B.C.E., copied from a Greek original, provides a quite remarkable illustration of the kroupezai (figure 14).[20] The performer, perhaps a satyr, operates the instrument with his right foot, which is connected to the upper half of the shoe by a strap across his instep. The two halves are hinged at the back, probably by a leather strap. Each half is composed of three parts: a sounding plate, probably rather like a metal tap; a thin sole; and a thick sole. In fact, the instrument gives the impression of two old sandals hinged together at the back. On the analogy of the krotala, however, it is possible that the thick sole is made of wood and hollowed out to increase the resonance of the instrument. The thin sole might be wood or leather.

The specific role played by the kroupezai in articulating the rhythm is not known. If the kroupezai were intended to help coordinate an ensemble—as certainly seems to be the case—, it is more likely that they struck some regular pulse rather than articulating each rhythmic pattern. As definitions of rhythm in Greek and Latin treatises emphasize the importance of arsis and thesis in defining the various feet, it is possible that the kroupezai marked the thesis in each foot or each individual metron. Three examples illustrate this point. In their references to arsis and thesis (or *sub-*

---

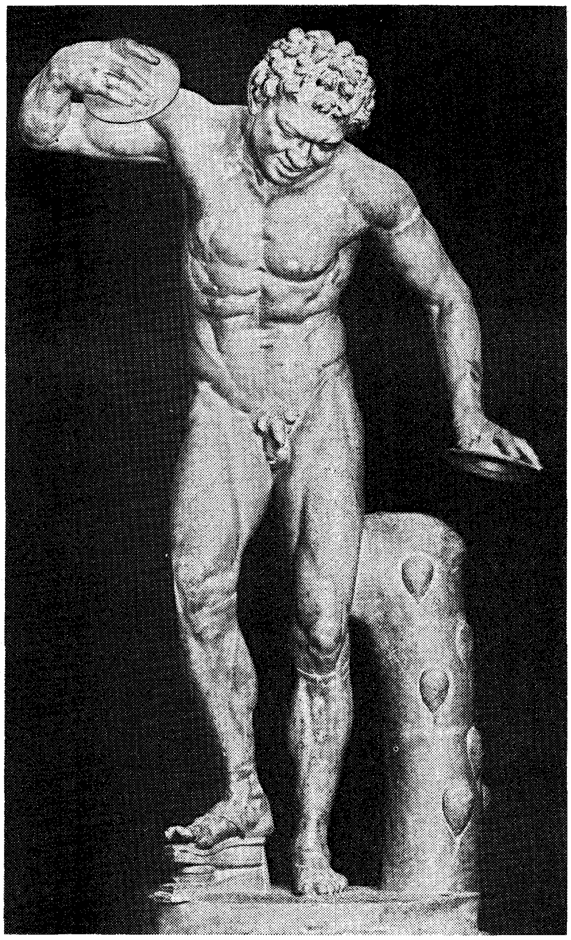
[17] On the koruphaios, see chapter 2 (pp. 97–98 and 100–101 *supra*).

[18] This is not as paradoxical as it may seem if one has in mind the role played by a conductor with a baton leading a large ensemble. In both jazz and traditional ensembles, however, the leader sets the tempo, but it is up to the percussionist to maintain it throughout the performance.

[19] On the increasing importance of the aulete, see chapter 2 (pp. 75, 78–81, 105–6, and especially the Pratinas fragment on pp. 92–93 *supra*).

[20] Florence, Uffizi. This statue forms the basis of an extended discussion of the kroupezai in Annie Bélis, "ΚΡΟΥΠΕΖΑΙ, Scabellum," *Bulletin de correspondance hellénique* 112 (1988): 323–39.

latio and *positio*), Aristides Quintilianus and Marius Victorinus comment on the alternation between noise and quietude, and Augustine makes specific reference to the role of the kroupezai (which he calls *scabella*) in articulating the larger metric patterns. In addition, a number of the musical fragments exhibit dots or stigmai (στιγμαί) that quite clearly mark rhythmic or metric patterns. If the kroupezai also sounded at these points, an ensemble could easily follow the pattern.[21]



Alinari/Art Resource, NY

Figure 14.

---

[21] Aristides Quintilianus *De musica* 1.13; Marius Victorinus *Ars grammatica* (Henricus Keil, *Grammatici Latini*, 8 vols. [Leipzig: B. G. Teubner, 1855–80; reprint, Hildesheim: Olms, 1961], 6:40); and Augustine *De musica* 3.1. On the meaning of the dots (stigmai) that appear in many of the musical fragments, see chapter 2, pp. 115, 119–20, and 150 *supra*. See also Mathiesen, "Rhythm and Meter," 166–67, 173–78.

Kumbala or Krembala

While the krotala and the kroupezai produced a clapping sound of relatively low pitch with a wooden or wooden-metallic timbre, the kumbala (or krembala) were higher-pitched metallic instruments, rather like the finger-cymbals still common in Asian musical cultures. As with most of the idiophones, descriptions of the little cymbals are limited. Athenaeus, after speaking of various string and wind instruments in the *Deipnosophistae* (14.34–38 [633e–636c]), mentions the krembala as an example of instruments that simply produce a noise, and on the authority of Dicaearchus, he observes that they were popular with women for the accompaniment of dancing and, when played with the fingers, produced a high, clear sound. On the authority of Didymus, Athenaeus adds that some people use shells or pieces of pottery to create a rhythm for the dancers. As this description immediately follows his description of the krembala, it would seem that these might be alternative materials for the same instrument, but distinctions among krotala, kumbala, and krembala were no doubt flexible.[22] Athenaeus quotes two passages to illustrate the use of the term:

> This [i.e., the use of the krembala] is demonstrated in the song to Artemis, of which the beginning is: "Artemis, my mind bids me weave a hymn that will please you, if ever before, you have had delight from a damsel all bright with gold, sounding brass-cheeked krembala in her hands." Hermippus in these lines from *Gods* refers to striking the krembala as *krembalizein*: "knocking limpets off rocks, they strike the krembala."[23]

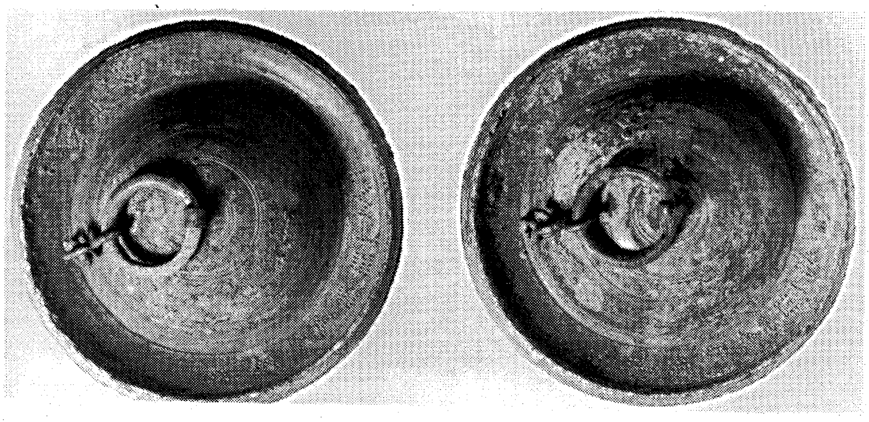
Pairs of kumbala, perhaps dating from the fourth or fifth century B.C.E., survive in the British Museum, the Metropolitan Museum in New York City, and the National Archaeological Museum in Naples; other pieces or single halves also survive, ranging from 5 to 18 cm in diameter. The kumbala in the British

---

[22] Cf. n. 10 *supra*. As noted earlier in connection with distinctions among the musico-poetic types, absolute generic purity is a modern aesthetic concept (see chapter 2, p. 93 n. 140).

[23] *Deipnosophistae* 14.39 (636d): δηλοῦσθαι δὲ ἐν τῷ τῆς 'Αρτέμιδος ᾄσματι οὗ ἐστιν ἀρχή· "Αρτεμι, σοί μ' ἔπι φρὴν ἐφίμερον ὕμνον ἱέμεν', αἴ τί σε καὶ πρόθεν ἆδέ τις ἄλλα χρυσοφαέννα κρέμβαλα χαλκοπάρᾳ' ⟨ἰάχοισα⟩ χερσίν. "Ερμιππος δ' ἐν Θεοῖς τὸ τούτοις κρούειν κρεμβαλίζειν εἴρηκεν ἐν τούτοις· λεπάδας δὲ πετρῶν ἀποκόπτοντες κρεμβαλίζουσι (Kaibel 3:404–5, the first verses as emended in *Lyra Graeca*, 3:508; cf. *Greek Lyric*, 5:374). Cf. *Deipnosophistae* 4.58 (164e [Kaibel 1:371]). A similar term, *krembaliastun*, appears in the Homeric hymn *In Apollinem*; see chapter 2, n. 120 *supra*.

Museum (figure 15) have raised domes on each half, in the center of which a small ring is provided to enable the two halves to be linked together. On the rim, the inscription Ωάτας εἰμί appears.[24]



item 4-12.1. ©Copyright the British Museum

Figure 15.

In addition, kumbala are portrayed in statuary (see figure 14) and vase painting. These kumbala are represented with a strap over each hand, and they are played with arm rather than finger movement.[25]

The kumbala, krembala, krotala, and kroupezai with their indeterminate or very high pitch could be used with music in any tuning. Moreover, because instruments of this sort can produce a wide dynamic range and very sharp point of articulation followed by a rapid decay of sound, these four instruments provided the Greeks with the ideal percussion instruments to color, emphasize, and articulate rhythmic patterns. In the case of the krotala, it is possible to envision that a single performer might even sound two separate patterns, a larger, slower metric pattern and a shorter, faster rhythmic pattern.

---

[24] The meaning of the inscription is uncertain: it probably means "I belong to Oatas." For a photograph of the kumbala now preserved in Naples, see *Pompeii and Its Museums*, Great Museums of the World (New York: Newsweek; Milan: Mondadori, 1979), 50.

[25] A bronze statuette from the middle of the sixth century B.C.E. (Athens, National Museum 15890) provides an additional example. A photograph appears as plate 32 in Max Wegner, *Griechenland*, Musikgeschichte in Bildern, II/4 (Leipzig: VEB Deutscher Verlag für Musik, n.d.).

Seistron and Rhombos

Greek musical culture was no different from later—even much later—musical cultures in liking instruments that simply produced a colorful sound. The seistron, commonly associated with the Egyptian cult of Isis,[26] was constructed of a metal oval attached to a handle and supporting several metal bars that would jangle when the instrument was shaken. In some instances, tiny bells may have been attached to the bars.

Pollux associates the krotala with the seistron when he states that it was used by wet-nurses to amuse sleepless infants so they would fall asleep.[27] Aristotle uses the term πλαταγή in *Politica* 8.6 (1340b25–31) to refer to the "rattle" of Archytas (ἡ Ἀρχύτου πλαταγή), which he commends as a useful toy for parents to give their children to amuse them and distract them from breaking things in the house. The verb πλαταγέω refers to clapping the hands, and Archytas's rattle was probably rather like the modern mounted castanets, which consist of a single castanet mounted on either side of a flat stick. When the stick is shaken, the castanets alternately strike the stick and produce a slapping or clapping sound.[28] The seistron, however, would have had a higher and more metallic tone, rather different from that of the krotala or Archytas's rattle.

As a term in the context of sound, rhombos simply refers to a whirling or rumbling. A number of instruments might make such a sound, and the term can therefore be applied to the bull-roarer, a piece of wood whirled around on a string, which produces a roaring noise from its friction with the air, or as a synonym for the rhoptron, a drum with bronze snares stretched across the head to provide a nasal buzzing sound. The bull-roarer might have been called a rhombos not only because of its whirling motion but also because the piece of wood may normally have been cut into a rhombus shape—that is, a shape with four equal sides but only opposite equal angles—to cause it to vibrate more vigorously and thus produce more sound as it whirled through the air. Its mysterious rising and falling pitch, associated particularly with the ceremonies of the priests of Cybele, the Korybantes, was caused by the speed with which the rhombos was spun.[29]

---

[26] See Plutarch *De Iside et Osiride* 63 (376c). Several seistra found in the Temple of Isis at Pompeii are now preserved in Naples, National Archaeological Museum; for a photograph of the instruments, see *Pompeii and Its Museums*, 50.

[27] *Onomasticon* 9.127: καλεῖται μὲν οὕτω καὶ τὸ κρόταλον καὶ τὸ σεῖστρον, ᾧ καταβαυκαλῶσιν αἱ τίτθαι ψυχαγωγοῦσαι τὰ δυσυπνοῦντα τῶν παιδίων (Bekker 392). On the lullaby (καταβαυκάλησις), see chapter 2, p. 155 *supra*.

[28] An illustration appears in *The New Harvard Dictionary of Music*, ed. Don Randal (Cambridge: Belknap Press of Harvard University Press, 1986), s.v. "percussion instruments." Archytas's rattle has sometimes been identified with an object shaped like a ladder that appears on hundreds of fourth-century red-figure Apulian vases—sometimes in association with musical instruments—and on molded terra cotta plaques from Taranto and Brindisi. This object has been described by some scholars as the "Apulian Xylophone," but there is no ancient testimony for such a name. Moreover, it now seems clear that this object is played by plucking the bars rather than striking them. See pp. 280–82 *infra*.

Rhoptron and Tumpana

The rhoptron, which was also associated with the Korybantes, is described by Plutarch in his life of Crassus as an instrument used by the Parthians to frighten their opponents in battle:

> For the Parthians do not incite themselves to battle with horns or salpinxes but rather with rhoptra made of hide, and stretching bronze snares over the hollows, they made a noise all at once from many places.[30]

---

[29] Archytas fr. 1 describes this very phenomenon: καὶ τοῖς ῥόμβοις τοῖς ἐν ταῖς τελεταῖς κινουμένοις τὸ αὐτὸ συμβαίνει· ἡσυχᾶι μὲν κινούμενοι βαρὺν ἀφιέντι ἆχον, ἰσχυρῶς δέ, ὀξύν. The Archytas fragments are collected in Hermann Diels, *Die Fragmente der Vorsokratiker*, 4th ed., 3 vols. (Berlin: Weidmann, 1922), 1:330–38. Fr. 1 is translated in Kathleen Freeman, *Ancilla to the Pre-Socratic Philosophers: A Complete Translation of the Fragments in Diels,* Fragmente der Vorsokratiker (Cambridge: Harvard University Press, 1971), 78–79. The authenticity of this fragment has been questioned by Walter Burkert, *Lore and Science in Ancient Pythagoreanism*, trans. E. L. Minar, Jr. (Cambridge: Harvard University Press, 1972), 379 n. 46. For counter-arguments in defense of the fragment, see Alan C. Bowen, "The Foundations of Early Pythagorean Harmonic Science: Archytas, Fragment 1," *Ancient Philosophy* 2 (1982): 79–104; and Carl A. Huffman, "The Authenticity of Archytas Fr. 1," *Classical Quarterly* n. s. 35 (1985): 344–48.

The construction of the rhombos is described in the scholia to Clement of Alexandria *Protrepticus* 2.17.2 and in Hesychius Lexicographus (*Hesychii Alexandrini lexicon*, 5 vols., ed. M. Schmidt [Jena: Mauk, 1858–68; reprint, Amsterdam: Hakkert, 1965]), s.v. ῥόμβος.

[30] Πάρθοι γὰρ οὐ κέρασιν οὐδὲ σάλπιγξιν ἐποτρύνουσιν ἑαυτοὺς εἰς μάχην, ἀλλὰ ῥόπτρα βυρσοπαγῆ καὶ κοῖλα περιτείναντες ἠχείοις χαλκοῖς ἅμα πολλαχόθεν ἐπιδουποῦσι (557e [text in *Plutarchi vitae parallelae*, 5 parts in 3 vols., ed. K. Ziegler (Leipzig: B. G. Teubner, 1964–71), I/2:126–77]). Eugene W. Bushala, "ῥόπτρον as a Musical Instrument," *Greek, Roman, and Byzantine Studies* 10 (1969): 169–72, interprets the textual evidence to mean that the rhoptron was a noisemaker or clapper, but not a drum.

Plutarch observes that the rhoptra make a dead, hollow noise, like the bellowing of beasts mixed with the sound of thunder, and in fact, the term he uses to refer to the snares (ἠχεῖον) is used by the scholiast to Aristophanes's *Nubes* to refer to the stage-thunder.[31] Plutarch's definition is very similar to the definition provided by the *Suda* for tumpana. It comments on the frightening boom (βόμβος) of the tumpana used by "the Indians" instead of the salpinx and describes the tumpana as constructed of hollowed out pine or fir, fitted with bronze bells (κώδωνες). The mouth (στόμα) of the tumpanon is then covered with oxhide.[32] Although Plutarch and the *Suda* employ different terminology in their definitions, both are clearly speaking of the same people: Parthia is a region to the southeast of the Caspian sea, an area now part of Iran and Afghanistan.

It is important to note in both definitions that the drum is described as a hollowed object with only one opening, not as a short hollow frame with two openings. Moreover, the bronze objects are not attached to the outside of the drum. In Plutarch's definition, they are stretched over the hollow, and in the definition of the *Suda*, they are fitted into the drum before it is covered with oxhide. Although modern scholarship commonly refers to the rhoptron as a tambourine, the shape, construction, and sound of the rhoptron are nothing like the modern tambourine, and even a chorus of tambourines could hardly produce the sort of sound described by Plutarch and the *Suda*. On the other hand, the sound of an ensemble of snare drums, especially if they were large, could be quite overwhelming and indeed terrifying in battle.

In addition to the rhoptra, the Greeks also used ordinary frame drums. Vase painters sometimes show these held by one hand inside the frame, which would indicate that only one end of the frame was covered with skin. The drums, however, are also shown held by a handle, and in these cases, both ends may have been covered with skin. A fifth-century red-figure volute krater, for example, illustrates a group of bacchantes dancing to the music of the aulos, a drum with handles, and kumbala (see figure 16).[33] The aulete stands, but the other figures are vigorously engaged in the dance.

---

[31] Scholia to Aristophanes *Nubes* 292.

[32] οἱ Ἰνδοὶ ἀντὶ τῆς σάλπιγγος ταῖς μάστιξιν ἀπεκτύπουν εἰς τὸν ἀέρα, εἶχον δὲ καὶ τύμπανα φρικώδη τινὰ βόμβον ἒξ ἑαυτῶν ἀνιέντα. ἦν δὲ ἡ κατασκευὴ τοιάδε. φιτρὸν ἐλάτης κοιλάναντες ἐνήρμοζον εἰς αὐτὸν κώδωνας ὀρειχάλκου, τὸ δὲ στόμα τοῦ ἄγγους ταυρείῳ δέρματι περικυτώσαντες μετέωρον ἔφερον ἐς τὰς μάχας τοῦτο τὸ τύμπανον. ἐπὰν δὲ θόρυβον πολὺν ἐργάσασθαι ἤθελον ἢ σημᾶναί τι, καταστρέψαντες ἐπὶ τὸ στόμα τὸ ξύλινον ἄγγος ἐτίνασσον, οἱ δὲ ἐν αὐτῷ κώδωνες πολλοί τε ἅμα ὄντες καὶ μεγάλοι ἔν τε στεγανῷ ἠχοῦντες ἀσαφῆ τινὰ βόμβον ἀνέπεμπον ἔνδοθεν, ὅνπερ οὐ ῥᾴδιον ἦν τοῖς οὐκ εἰδόσιν ἐπιγνῶναι τίνος ἦν ὀργάνου ἢ θηρίου· βρυχήματι γὰρ ἐῴκει (Bekker 1049).

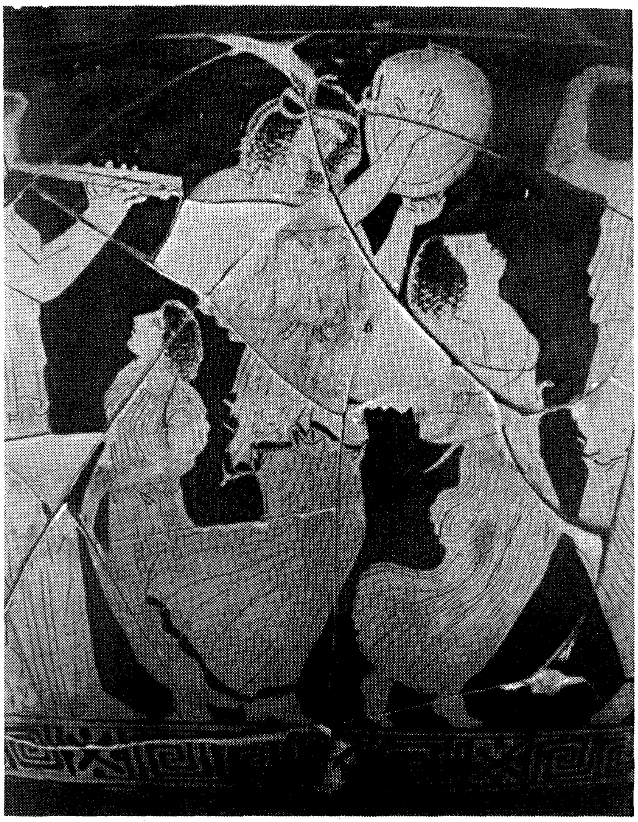

Scala/Art Resource, NY

Figure 16.

Rhoptra and frame drums alike seem to have been played with the fingers rather than with sticks of any sort. Although drums are sometimes shown in association with auloi and other percussion instruments, they were frequently used as solo instruments to accompany dance in the celebrations of Dionysus and Cybele[34] or as instruments of the battlefield, together with the salpinx and horn. A fifth-century Pelike of the Kleophrades painter (figure 17) shows a typical scene with Dionysus and a satyr dancing to the drum music of a bacchante.[35]

---

[33] By the Polygnot-group painter (ca. 435 B.C.E.). Ferrara, Museo Nazionale Archeologico. The kumbala player appears several figures to the right and cannot be seen in this illustration. See also figure 3.

[34] See Herodotus *Historiae* 4.76; *Suda*, s.v. τύμπανον; and Euripides *Bacchae* 55–63, *Cyclops* 63–70, 203–5, and *Hercules furens* 892–99. On the association of drums and kumbala—and their use in the rites of Cybele and Dionysus—see Athenaeus *Deipnosophistae* 4.29 (148c–d), 5.28 (198d), 8.63 (361e), 14.14 (621b–c), and 14.38 (636a–c).

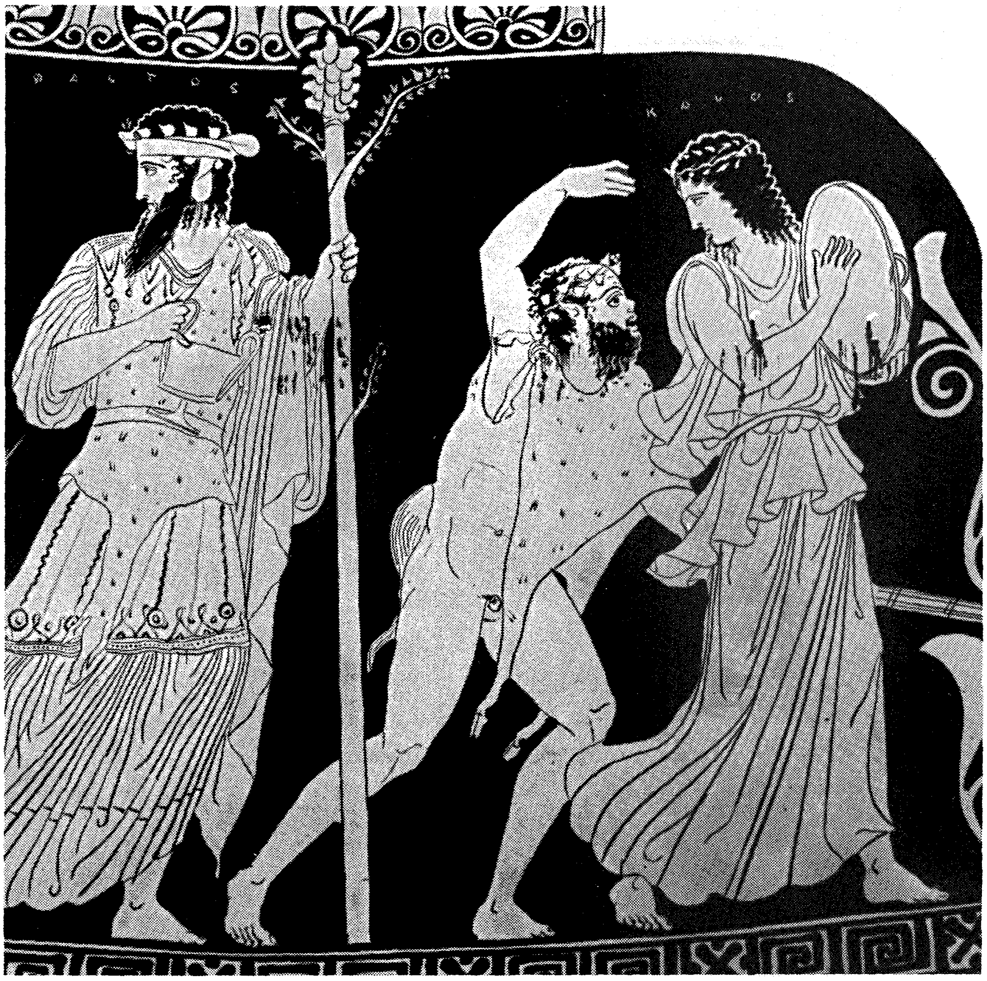


Foto Marburg/Art Resource, NY

Figure 17.

Aerophones

The primary wind instruments of the Greeks were the aulos (αὐλός), syrinx (σῦριγξ), hydraulis (ὕδραυλις), salpinx (σάλπιγξ), and horn (κέρας). Wind instruments, like the percussion, were associated particularly with the cults of Cybele and Dionysus, and the instruments were always regarded with some ambivalence in Greek musical culture as not truly "Greek." This is reflected in the various myths surrounding the discovery of the aulos and the syrinx. While the invention of the lyre is clearly assigned to Hermes and the instrument is inextricably linked to Apollo,[36] legend places the origin of the aulos in Phrygia. An origin in Asia Minor naturally links the aulos with Dionysus because prominent cults of Dionysus existed in both Phrygia and Thrace.[37] Indeed, it was commonly assumed by ancient authorities that the god—and thus his music—had come to Greece from these "foreign" regions. The syrinx, likewise, was said to have been invented by Cybele, the Celts, or other gods or non-Greek peoples. Nevertheless, as the aulos and the other wind instruments became fixtures of Greek musical culture in the festivals, symposia, the theatre, and everyday life, other legends attributed the discovery of the aulos to Apollo and to Athena, who threw it away when she realized that playing it distorted her features. The instrument, it seems, landed in Phrygia, thereby providing a neat way of linking the two traditions.

---

[35] München, Staatliche Antikensammlung 2361 (J. 776).

Aulos

The aulos was certainly the most important of the Greek wind instruments, and its use in many of the musical forms has already been considered in chapter 2.[38] In addition to the larger cultural view of the instrument, literary sources provide a substantial amount of information—some of it quite detailed—about the origin, history, and construction of the aulos, and the numerous archaeological remains and iconographic representations provide specific examples for study. Based on all this information, rather complete reconstructions of Greek auloi are possible, and these in turn enable observations to be made about the timbre, pitch, tuning, and performance practice of the instrument.[39]

---

[36] Note, for example, excerpts from the Homeric hymns *In Apollinem* and *In Mercurium* in chapter 2 (pp. 35–36 *supra*).

[37] See map 1, p. 20.

[38] See pp. 24–25, 27, 43, 55, 59–61, 75, 78, 82, 86, 92–93, 102, 105–7, 110, 123, 128, 131–33, 137–38, 141, 153, and 155 *supra*.

[39] Important comprehensive studies of the aulos appear in Karl von Jan, "Die griechischen Flöten," *Allgemeine musikalische Zeitung* 16 (1881): 465–70, 481–88, and 497–502; Kathleen Schlesinger, *The Greek Aulos* (London: Methuen, 1939; reprint, Groningen: Bouma, 1970); Albert A. Howard, "The Αὐλός or Tibia," *Harvard Studies in Classical Philology* 4 (1893): 1–60; idem, "The Mouth-Piece of the Αὐλός," *Harvard Studies in Classical Philology* 10 (1899): 19; and Heinz Bec-

Origin and history

The association of the aulos with the Eastern peoples is already attested in Book X of the *Iliad,* where the auloi are first heard coming from the camp of the Trojans:

> Now he [Agamemnon] would gaze across the plain to the Trojan camp, wondering at the number of their fires that were burning in front of Ilion, toward the high calls of the auloi and syrinxes, the murmur of people.[40]

Later, in Book XVIII, the auloi are represented on the "Shield of Achilles":

> On it he wrought in all their beauty two cities of mortal men. And there were marriages in one, and festivals. They were leading the brides along the city from their maiden chambers under the flaring of torches, and the loud hymenaios was arising. The young men followed the circles of the dance, and among them the auloi and the phorminxes kept up their clamor as in the meantime the women standing each at the door of her court admired them.[41]

In the Plutarchean dialogue *De musica,* Lysias refers to "Notices on Phrygia" by a certain Alexander, which states that the music of the aulos was brought to the Greeks by Olympus. Alexander posits a rough chronology in which Hyagnis is the first to play the aulos, followed by his son Marsyas, and then Olympus—all Phrygians.[42] Lysias later adds that Olympus learned to play the aulos from Marsyas, but he thinks there may have been two auletes named Olympus, an elder who was actually taught by Marsyas and introduced the enharmonic nomoi now played in the Greek festivals, and a younger who composed the famous Polykephalos nomos.[43]

---

ker, *Zur Entwicklungsgeschichte der antiken und mittelalterlichen Rohrblattinstrumente,* Schriftenreihe des Musikwissenschaftlichen Instituts der Universität Hamburg, vol. 4 (Hamburg: Sikorski, 1966).

[40] *Ilias* 10.11–13: ἤτοι ὅτ' ἐς πεδίον τὸ Τρωικὸν ἀθρήσειε, I θαύμαζεν πυρὰ πολλά, τὰ καίετο Ἰλιόθι πρό, I αὐλῶν συρίγγων τ' ἐνοπὴν ὅμαδόν τ' ἀνθρώπων· Translation adapted from Lattimore, *Iliad,* 218.

[41] *Ilias* 18.490–96: ἐν δὲ δύω ποίησε πόλεις μερόπων ἀνθρώπων I καλάς. ἐν τῇ μέν ῥα γάμοι τ' ἔσαν εἰλαπίναι τε, I νύμφας δ' ἐκ θαλάμων δαΐδων ὕπο λαμπομενάων I ἠγίνεον ἀνὰ ἄστυ, πολὺς δ' ὑμέναιος ὀρώρει. I κοῦροι δ' ὀρχηστῆρες ἐδίνεον, ἐν δ' ἄρα τοῖσιν I αὐλοὶ φόρμιγγές τε βοὴν ἔχον· αἱ δὲ γυναῖκες I ἱστάμεναι θαύμαζον ἐπὶ προθύροισιν ἑκάστη. Translation adapted from Lattimore, *Iliad,* 388. On the hymenaios, see chapter 2, pp. 126–31 *supra.*

[42] Plutarch *De musica* 1132e–f (Ziegler 5.3–7). This general chronology is confirmed by the *Suda,* s.v. Ὄλυμπος 2.

[43] Plutarch *De musica* 1133d–e (Ziegler 6.19–7.5). On the Polykephalos nomos, see chapter 2, pp. 63–64 *supra.*

When it is his turn to speak, Soterichus rejects all of these figures as the inventor of the aulos; rather, Apollo is the inventor of music both for the lyre and for the aulos. He notes that a very ancient statue of Apollo at Delos shows the god with the three Graces—one holding the lyre, another holding auloi, and the third holding the syrinx[44]—and further supports his association of the aulos with Apollo by referring in general to the testimony of Alcaeus, Alcman, and Corinna.[45]

Corinna is important to Soterichus's argument because in her poem, Apollo is taught to play the aulos by Athena. The association of these two gods with the aulos represents, of course, the gradual acceptance of the aulos as a legitimate "Greek" instrument. Nevertheless, Athena decides to discard the aulos, and this may be seen as an allegory for the desire to maintain the superiority of endemic Greek over adopted foreign culture. In his dialogue *De cohibenda ira,* Plutarch recalls the reason for the rejection of the instrument by Athena:

> Those who like to jest say that when Athena played the auloi, she was rebuked by a satyr and did not heed these lines:
>
> That form does not suit you; give up the auloi
> And seize your arms and set right your cheeks;
>
> but when she saw the appearance of her countenance in a river, she was vexed and threw away the auloi.[46]

Athenaeus quotes a similar passage from Melanippides's *Marsyas* in which Athena, casting away the auloi, says: "Away, shameful things, an affront to my body! I do not give myself to ugliness."[47]

Aristides Quintilianus, in assigning various musical instruments to the gods and the Muses in his *De musica* (2.19), offers a more complex reason for Athena's rejection of the aulos:

---

[44] Pausanias 9.35.3 confirms the existence of this statue with the three graces but does not indicate the presence of the musical instruments.

[45] Plutarch *De musica* 1135f–1136b (Ziegler 12.2–24).

[46] καὶ γὰρ τὴν Ἀθηνᾶν λέγουσιν οἱ παίζοντες αὐλοῦσαν ὑπὸ τοῦ σατύρου νουθετεῖσθαι καὶ μὴ προσέχειν· οὔ τοι πρέπει τὸ σχῆμα· τοὺς αὐλοὺς μέθες | καὶ θὦπλα λάζευ καὶ γνάθους εὐθημόνει· | θεασαμένην δὲ τοῦ προσώπου τὴν ὄψιν ἐν ποταμῷ τινι δυσχερᾶναι καὶ προέσθαι τοὺς αὐλούς (456b [text from *Plutarch's Moralia,* 6:110]).

[47] *Deipnosophistae* 14.7 (616e–f): ἔρρετ' αἴσχεα, σώματι λύμα, | ἐμὲ δ' ἐγὼ κακότατι δίδωμι (Kaibel 3:360). On the association of the aulos with Athena, note also Pindar's twelfth Pythian Ode (see p. 64 *supra*).

> Again, in the case of the auloi, the melody flattering the quantity of men and part of the soul desiring pleasure, they assigned to the one advising that the sweet vie with the beautiful, in accord with her appellation, to Euterpe; the other type, able occasionally to benefit through much science and discretion but not however departing absolutely from its natural femininity, they allot no longer to the masculine of the gods, but rather to the one feminine in genus, discreet and warlike in ethos, to Athena. So then, in displaying that the benefit through auletic melody is short and advising the wise to avoid for the most part the facility of it, they say that the goddess threw away the auloi as not adding suitable pleasure for those desiring wisdom; but this type of melody is utilized for those of mankind worn out and exhausted because of continuous work and labor.[48]

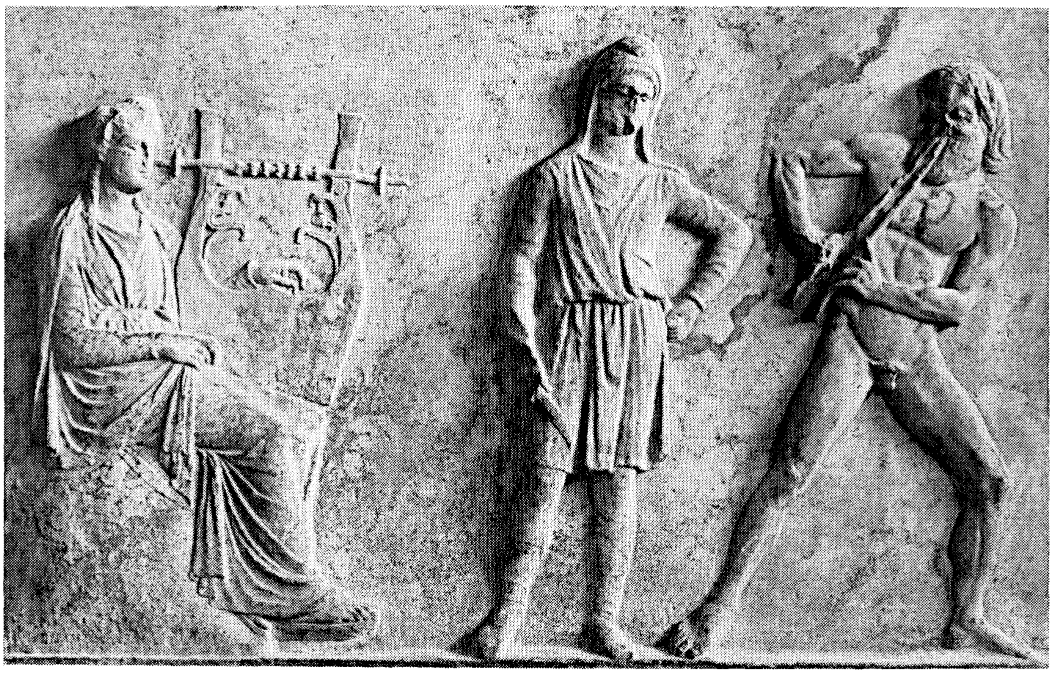
This explanation draws heavily on Platonic and Pythagorean notions about the types of music that are most beneficial to mankind, and its essence lies in the presumed superiority of the stringed instruments, which have been associated with Hermes and Apollo.

The musical contest between Apollo and Marsyas embodies a similar allegory for the superiority of endemic Greek culture. In Diodorus Siculus's description of this contest in his *Bibliotheca* 3.59, Apollo's music is judged superior by the Muses, and as the loser, Marsyas is hanged and skinned alive. Aristides Quintilianus observes that Marsyas suffered this penalty because he "dignified his music beyond its worth."[49] The contest is illustrated in the famous panel (figure 18) by the Praxitelean sculptor, which is also perfectly described by Pausanias.[50] The panel formed one side of a pedestal on which were mounted statues of Leto, Apollo, and Artemis, sculpted by Praxiteles two generations after Alcamenes (i.e., around 360 B.C.E.) and displayed in a Mantineian temple for Leto and her children.

---

[48] πάλιν δὲ ἐπὶ τῶν αὐλῶν τὴν μὲν τὸ τῆς ἡδονῆς ἐφιέμενον πλῆθος ἀνδρῶν καὶ μέρος ψυχῆς κολακεύουσαν μελῳδίαν τῇ μετὰ τοῦ καλοῦ τὸ ἡδὺ παραινούσῃ ζηλοῦν κατὰ τὴν προσηγορίαν Εὐτέρπῃ προσένειμαν, τὴν δ' ὠφελεῖν δυναμένην σπανίως διὰ πολλὴν ἐπιστήμην καὶ σωφροσύνην, οὐ μὴν τέλεον τῆς φυσικῆς ἀποφοιτῶσαν θηλύτητος οὐκέτι ἄρρενι θεῶν, τῇ δὲ θηλείᾳ μὲν κατὰ γένος σώφρονι δὲ καὶ πολεμικῇ κατὰ τὸ ἦθος Ἀθηνᾷ νέμουσιν. τοιγαροῦν βραχεῖαν εἶναι τὴν δι' αὐτῆς ὠφέλειαν ἐπιδεικνύμενοι καὶ τοῖς σοφοῖς φεύγειν κατὰ τὸ πολὺ τὴν δι' αὐλητικῆς ῥᾳστώνην παραινοῦντες, ἀπορρῖψαι τὴν θεόν φασι τοὺς αὐλοὺς ὡς οὐ πρόσφορον ἡδονὴν ἐπιφέροντας τοῖς σοφίας ἐφιεμένοις, τοῖς δὲ διὰ τὰς συνεχεῖς δημιουργίας τε καὶ ἐργασίας καματηροῖς τε καὶ ἐπιπόνοις τῶν ἀνθρώπων χρησιμεύουσαν (W.-I. 91.9–23). Mathiesen, *AQ on Music,* 156. Cf. Aristotle *Politica* 8.6 (1341b1–8). Euterpe is also associated with the aulos in *Anthologia Palatina* 9.504–5.

[49] οἷον δὴ καὶ τὸν Μαρσύαν παρεισήγαγον, ὃν παρ' ἀξίαν σεμνύνοντα τὴν αὑτοῦ μουσικὴν δίκη μετῆλθεν (W.-I. 91.23–25). Plutarch *Quaestiones convivales* 7.8 (713d) interprets the competition as representing a contest between pure instrumental music and the combination of song and the kithara. An aulete cannot play and sing simultaneously, and thus his music is inferior because it has no words. See also Xenophon *Anabasis* 1.2.8. For a modern interpretation, see James McKinnon, "The Rejection of the Aulos in Classical Greece," in *Music and Civili-*



Alinari/Art Resource, NY

Figure 18.

This legend is enlarged by the suggestion that Marsyas came upon the auloi after Athena put them aside, and in fact, Pausanias tells of a statue on the Acropolis that shows Athena striking Marsyas for picking up the instrument she had discarded.[51] Although it does not coincide precisely with Pausanias's description, a bronze statue group sculpted by Myron around 450 B.C.E. for the Acropolis survived in a Roman copy, and the Städtische Galerie Liebieghaus in Frankfurt exhibits a reconstruction (Inv. 195) of this statue group (figure 19).

---

zation: Essays in Honor of Paul Henry Lang, ed. Edmond Strainchamps and Maria Rika Maniates (New York: W. W. Norton, 1984), 203–14.

[50] Athens, National Archaeological Museum 215. The description appears in Pausanias 8.9.1.

[51] Pausanias 1.24.1.

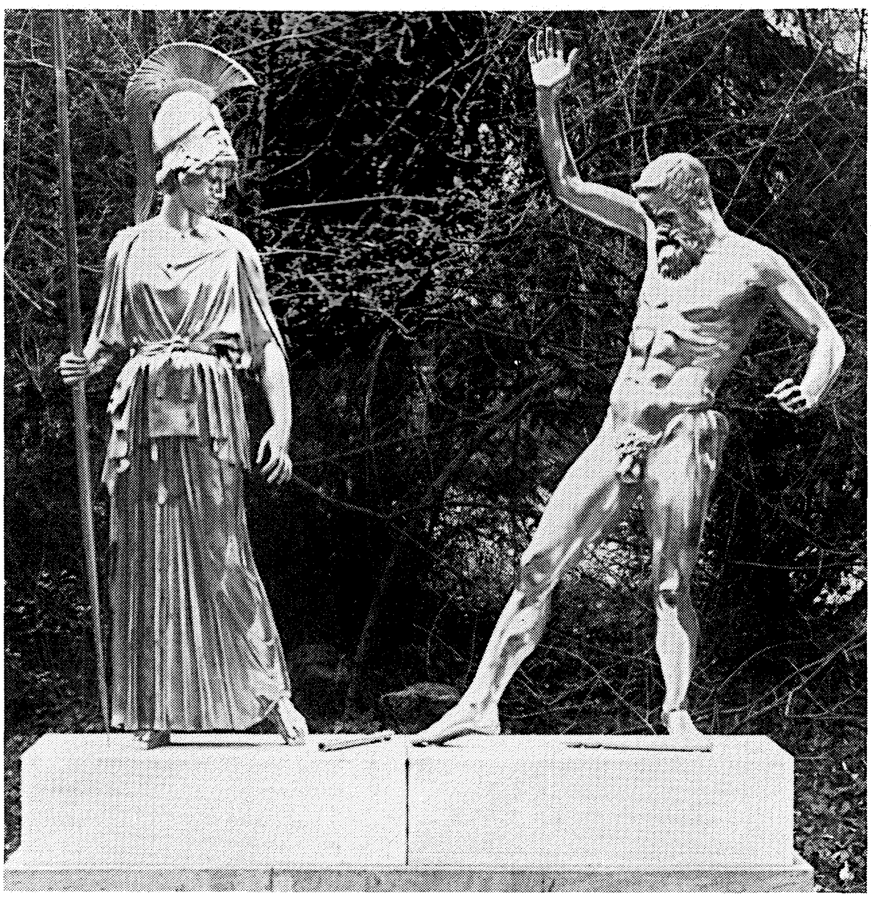


Figure 19.

Construction and types

However ambivalent the Greeks may have felt about the aulos, it was the subject of extended technical discussion in the writings of Aristotle, Aristoxenus, Theophrastus, Ptolemy, Pollux, Athenaeus, and Porphyrius, quoting Aelian in his commentary on Ptolemy's *Harmonica*. It should be stressed from the outset that the aulos is a reed instrument, not a flute, as the term αὐλός is still translated even in quite recent translations of Greek literature.[52] As a reed instrument, it consists of two quite distinct and separate parts: a mouthpiece and a resonator; the technical writings concern not only the various shapes and sizes of the resonator but also the material and construction of the reeds.

---

[52] That the aulos is not a flute has been noted on numerous occasions throughout the past century, but neither is it an oboe, which has begun to be offered as a substitute by some scholars. In fact, the aulos is an aulos and sounds nothing like any modern Western musical instrument. See pp. 204–18 *infra*.

The resonator of the aulos was made of all sorts of materials: reed, box or lotus wood, horn, deer bone, a branch of a dwarf laurel with the pith removed, ivory, and the bones of eagles or vultures.[53] Surviving remains of auloi indicate that the resonators were sometimes encased in metal and that the bore was cylindrical. The pipe was laterally pierced by a number of finger holes, which were called tremata (τρήματα) or trupemata (τρυπήματα). Pollux states that the aulos had only four trupemata until the time of a certain Diodorus of Thebes, who made one with "many holes" (πολύτρητος),[54] and Horace, too, comments in the *Ars poetica* that the aulos originally had only a few finger holes.[55] Four finger holes are frequently displayed in paintings of the aulos, but remains of Greek auloi exhibit more than four trupemata. Surviving pipes of Egyptian and other cultures, however, do have only four holes and thus tend to support Pollux's statement.[56]

While Pollux attributed to Diodorus of Thebes the expansion of the aulos beyond four trupemata, Athenaeus and Pausanias refer to Pronomus of Thebes as the one who developed an aulos that was capable of playing aulema in Dorian, Phrygian, or Lydian harmoniai. In his description of a statue of Pronomus in Boeotia, Pausanias observes:

> For a time, auletes had three types of auloi. They played Dorian aulema on one, different auloi were made for pieces in the Phrygian harmonia, and the so-called Lydian aulema was played on other auloi. Pronomus was the first

---

[53] Pollux *Onomasticon* 4.71: ἡ δὲ ὕλη τῶν αὐλῶν κάλαμος ἢ χαλκὸς ἢ λωτὸς ἢ πύξος ἢ κέρας ἢ ὀστοῦν ἐλάφου, ἢ δάφνης τῆς χαμαιζήλου κλάδος τὴν ἐντεριώνην ἀφῃρημένος (Bekker 159); 4.76: Σκύθαι δέ, καὶ μάλιστα τούτων 'Ανδροφάγοι καὶ Μελάγχλαινοι καὶ 'Αριμασποί, ἀετῶν καὶ γυπῶν ὀστοῖς αὐλητικῶς ἐμπνέουσιν (Bekker 160). Athenaeus *Deipnosophistae* 4.80 (182d–e) states that the lotus auloi were called photinges (φώτιγγες) by the Alexandrians and the deer-bone auloi were invented by the Thebans (Pollux 4.75 agrees); he adds that ivory auloi (ἐλεφάντινοι αὐλοί) were made by the Phoenicians.

[54] The terms appear, for example, in Archytas fr. 1, Aristotle *Problemata* 19.23 (919b1–14), Plutarch *De E apud Delphos* 389d, Porphyrius *In Ptol. Harm.* 1.3 (Düring 34 and 63), Proclus *In Platonis Alcibiadem*, and Pollux *Onomasticon* 4.80.

[55] "Tibia non, ut nunc, orichalco vincta tubaeque | aemula, sed tenuis simplexque foramine pauco" (202–3 [Fairclough 466]). The scholiast Acro, in his comment on these lines, confirms Horace's comment on the authority of Varro (see Howard, "The Αὐλός," 4).

[56] Howard, "The Αὐλός," 5.

> to have made auloi that were suited to every species of harmonia and the first to play on the same auloi mele that differed to such a degree. It is also said that he delighted his audience exceedingly with the form of his countenance and the movement of his entire body. He also composed for the Chalcidians on the Euripus a prosodion to Delos. So the Thebans erected this statue here as well as one of Epaminondas, the son of Polymnis.[57]

Whether Pronomus or Diodorus ought to be regarded as the more important innovator, Thebes was certainly the center of the expansion and development of the aulos.

The resonator alone could properly be called the aulos, even though it could not be played without the mouthpiece,[58] but bombyx (βόμβυξ) would seem to be another, perhaps more precise term for the resonator. Pollux describes the parts of auloi as the glotta (i.e., the reed-tongue or mouthpiece), trupemata, bombykes, holmoi, and hupholmia.[59] With the exception of glotta, each of these terms is plural. The plurals may suggest that each aulos has more than one of these parts—except for the reed—, and in this case, "bombykes" must refer to the fact that in some instances the bombyx as a whole is comprised of multiple parts. On the other hand, since Pollux is referring to the parts of auloi, itself a plural form, all the terms might be expected to be plural. There is no simple solution to this problem of terminology. A single aulos certainly has more than one trupema and may have more than one hupholmion, a sort of bulb-shaped extension inserted into the top of the resonator to increase its length. On the other hand, no single aulos could have more than one holmos, the holder for the reed.[60]

---

[57] *Graeciae descriptio* 9.12.5: τέως μέν γε ἰδέας αὐλῶν τρεῖς ἐκτῶντο οἱ αὐληταὶ καὶ τοῖς μὲν αὔλημα ηὔλουν τὸ Δώριον, διάφοροι δὲ αὐτοῖς ἐς ἁρμονίαν τὴν Φρύγιον ἐπεποίηντο οἱ αὐλοί, τὸ δὲ καλούμενον Λύδιον ἐν αὐλοῖς ηὐλεῖτο ἀλλοίοις· Πρόνομος δὲ ἦν ὃς πρῶτος ἐπενόησεν αὐλοὺς ἐς ἅπαν ἁρμονίας εἶδος ἔχοντας ἐπιτηδείως, πρῶτος δὲ διάφορα ἐς τοσοῦτο μέλη ἐπ' αὐλοῖς ηὔλησε τοῖς αὐτοῖς. λέγεται δὲ ὡς καὶ τοῦ προσώπου τῷ σχήματι καὶ τῇ τοῦ παντὸς κινήσει σώματος περισσῶς δή τι ἔτερπε τὰ θέατρα· καί οἱ καὶ ᾆσμα πεποιημένον ἐστὶ προσόδιον ἐς Δῆλον τοῖς ἐπ' Εὐρίπῳ Χαλκιδεῦσι. τοῦτον τε οὖν ἐνταῦθα οἱ Θηβαῖοι καὶ Ἐπαμινώνδαν τὸν Πολύμνιδος ἀνέθεσαν. Cf. Athenaeus *Deipnosophistae* 14.31 (631e), which merely states that Pronomus was the first to play all the harmoniai on the same auloi. On the prosodion, see chapter 2, pp. 81–83 (and pp. 28, 30, 46–47, 94, and 157 *supra*). See chapters 4–6 for a full discussion of the meaning of "harmonia."

[58] In the same manner, it is common to refer to the body of the modern single- and double-reed instruments as the bassoon, oboe, or clarinet, even in the absence of the reed or mouthpiece.

[59] Pollux *Onomasticon* 4.70: τῶν δὲ ἄλλων αὐλῶν τὰ μέρη γλῶττα καὶ τρυπήματα καὶ βόμβυκες καὶ ὅλμοι καὶ ὑφόλμια (Bekker 159).

Elsewhere in the *Onomasticon*, Pollux uses the term "bombyx" in his description of the various types of auloi that are suited to certain aulema.[61] As he is speaking of the sound of the instrument, when he writes "The aulema of the bombykes is enthusiastic and frenzied, suited to the rites of Dionysus," the term would seem to be a synonym for "auloi."[62] If the bombyx is the resonator of the aulos, the most visible part of the instrument, the use of the term as a synonym for the entire instrument is perfectly appropriate. The term is employed by other writers as well in speaking about the aulos, and their usage tends to support Pollux's definition. In his *Quaestiones convivales*, Plutarch refers to the soothing effect of the aulos at symposia if it avoids arousing the guests "with bombykes and polychordia." The term might again be taken simply as a synonym for its resonators or it might be referring to the lowest notes of the instrument, produced by the bombyx when all the holes are closed by the performer.[63] In the *Metaphysica* (14.6), Aristotle refers to the analogy between the interval from the first to the last letter of the alphabet and the interval from the bombyx to the highest note on the auloi.[64] Here, it seems apparent that the term refers to the note produced by the full length of the resonator, with all the holes closed. The Aristotelian *De audibilibus*, in speaking of the variety of sounds produced by long wind-pipes, observes that all creatures with long necks—such as geese, cranes, and cocks—have a forceful tone to their voices. This leads to the comparison:

---

[60] These bulb-like extensions can be seen in figures 3, 11, 13, and 18. Their purpose will be more fully discussed below; see also Howard, "The Αὐλός," 28–29.

[61] Pollux *Onomasticon* 4.80–82. On some of the aulema, see chapter 2, pp. 131 and 155 *supra*.

[62] Pollux *Onomasticon* 4.82: τῶν δὲ βομβύκων ἔνθεον καὶ μανικὸν τὸ αὔλημα, πρέπον ὀργίοις (Bekker 161).

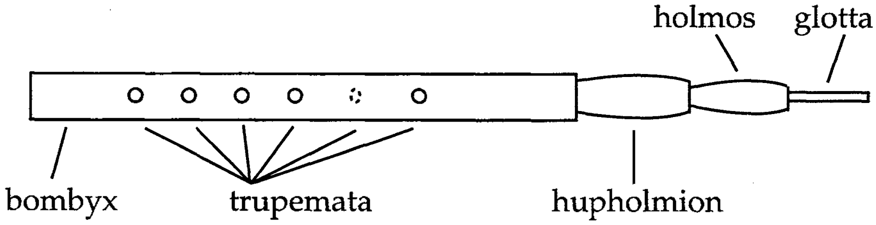
[63] *Quaestiones convivales* 7.8: ἄν γε δὴ καὶ αὐτὸς τὸ μέτριον διαφυλάττῃ μὴ παθαινόμενος μηδ' ἀνασοβῶν καὶ παρεξιστὰς βόμβυξι καὶ πολυχορδίαις τὴν διάνοιαν ὑγρὰν ὑπὸ τῆς μέθης καὶ ἀκροσφαλῆ γεγενημένην (713a [text from *Plutarch's Moralia*, 9:86]). cf. Euripides *Bacchae* 120–34 and 151–67 and *Helena* 1338–52. The lower pitches, perhaps because of their greater resonance, seem to have been considered more exciting. Among the chordophones, the barbitos was especially associated with Dionysus (see figure 12, for example), and this instrument, with strings noticeably longer than those of the lyre, phorminx, or kithara, most probably produced lower pitches. See pp. 249–53 *infra*.

[64] καὶ ὅτι ἴσον τὸ διάστημα ἔν τε τοῖς γράμμασιν ἀπὸ τοῦ Α πρὸς τὸ Ω καὶ ἀπὸ τοῦ βόμβυκος ἐπὶ τὴν ὀξυτάτην νεάτην ἐν αὐλοῖς (1093b2–4 [Jan 35.5–7]).

> The following is even more evident in the case of the auloi, for everyone fills the bombykes with difficulty and with considerable strain because of the length of the tube. Moreover, because of the narrowness, the breath, when it escapes to the outside after being compressed, immediately pours out and is dispersed, just like streams carried through straits.[65]

In this instance, there can be no doubt that the bombykes are the resonators of the aulos.

The various parts of the instrument are represented in figure 20.



(the dotted circle indicates a trupema on the reverse side)

Figure 20.

The Aristotelian passage adds that the aulos is narrow, no doubt in reference to the bore. This is confirmed by the surviving fragments, which exhibit bores of only ca. 5–10 mm, and the testimony of Aelian, who refers specifically to the bores (κοιλίαι) of different auloi:

> Again, if you take two auloi equal in length but differing in the widths of their bores, as are the Phrygian with respect to the Greek, you will discover, on the whole, that the wide-bore instrument emits a higher note than the narrow-bore. We see that the Phrygian auloi are narrow in respect to their bores and project much lower sounds than the Greek auloi. And with respect to this, the cause is the speed of motion, for in those with narrow

---

[65] μᾶλλον δὲ τοῦτο καταφανές ἐστιν ἐπὶ τῶν αὐλῶν· πάντες γὰρ χαλεπῶς πληροῦσι τοὺς βόμβυκας καὶ μετὰ συντονίας πολλῆς διὰ τὸ μῆκος τῆς ἀποστάσεως. ἔτι δὲ τὸ πνεῦμα διὰ τὴν στενοχωρίαν ὅταν ἐντὸς θλιβόμενον εἰς τὸν ἔξω τόπον ἐκπέσῃ, παραχρῆμα διαχεῖται καὶ σκεδάννυται, καθάπερ καὶ τὰ ῥεύματα φερόμενα διὰ τῶν εὐρίπων (*Aristotelis opera*, ed. Immanuel Bekker [Berlin: Reimer, 1831], 800b25–30). *De audibilibus* is preserved in Porphyrius's commentary (Düring 67.24–77.18) on Ptolemy's *Harmonica*. For a separate edition and English translation, see Aristotle, *Minor Works*, ed. and trans. W. S. Hett, Loeb Classical Library (Cambridge: Harvard University Press, 1936).

> channels, because the breath has a difficult road and is compressed by the smallness of the channel, its motion is slower; but in those using a wider bore, as there is no obstruction, the exit of the breath is faster; and the same thing can be perceived in a single aulos.[66]

Aelian qualifies his first observation with the phrase "on the whole" (παραπλησίως) because he recognizes that the actual pitch of the aulos is determined by its reed, not by the length of the resonator.

The surviving fragments make it clear that the flare of the holmos and hupholmion was decorative: the diameter of the actual bore is consistent—or nearly consistent—throughout each instrument. Like woodwind instruments of every period, auloi were assembled in sections. The holmos and hupholmion were normally separate parts, joined to each other and to the bombyx by spigot-and-socket joints. The spigots of some of the fragments exhibit light scoring, and it is likely that these were wrapped with waxed thread to form a tight seal in the joint. The bombyx, too, was usually constructed in sections fitted with spigot-and-socket joints, although each of the Elgin auloi in the British Museum and the Louvre auloi were made of single pieces of sycamore wood. In a few cases, the bottom of the bombyx flared or was joined to another section very much like the bell of the modern clarinet. Some auloi were encased in metal and decorated with foil coverings.[67]

---

[66] πάλιν δ' ἐὰν λάβῃς δύο αὐλοὺς τοῖς μὲν μήκεσιν ἴσους, ταῖς δ' εὐρύτησι τῶν κοιλιῶν διαφέροντας, καθάπερ ἔχουσιν οἱ Φρύγιοι πρὸς τοὺς Ἑλληνικούς, εὑρήσεις παραπλησίως τὸν εὐρυκοίλιον ὀξύτερον προϊέμενον φθόγγον τοῦ στενοκοιλίου. θεωροῦμέν γέ τοι τοὺς Φρυγίους στενοὺς ταῖς κοιλίαις ὄντας καὶ πολλῷ βαρυτέρους ἤχους προβάλλοντας τῶν Ἑλληνικῶν. καὶ ἐπὶ τούτων οὖν τὸ τάχος τῆς κινήσεως αἴτιον. ἐπὶ μὲν γὰρ τῶν στενοπόρον δυσοδοῦντος τοῦ πνεύματος καὶ τῇ μικρότητι τοῦ πόρου θλιβομένου βραδυτέρα κίνησις αὐτοῦ γίνεται, ἐπὶ δὲ τοῦ εὐρυτέρᾳ τῇ κοιλίᾳ κεχρημένου, ἅτε δὴ μηδεμιᾶς ἐγκοπῆς γινομένης ἡ διέξοδος τοῦ πνεύματος ταχυτέρα συμβαίνει καὶ εφ' ἑνὸς αὐλοῦ ταὐτὸ κατανοῆσαι δυνατόν ἐστι (Düring 34.11–21). It is noteworthy that Aelian employs some of the same terminology found in the Aristotelian passage.

[67] This is not the place to repeat the details of all the archaeological remains or the various hypotheses applied to them by scholars. Reports appear in Howard, "The Αὐλός," 47–60 (four auloi from Pompeii, two instruments from the Castellani collection, and the two Elgin auloi); Schlesinger, *Aulos*, 408–518; Nicholas B. Bodley, "The Auloi of Meroë: A Study of the Greek-Egyptian Auloi Found at Meroë, Egypt," *American Journal of Archaeology* 50 (1946): 217–40 and plates I–VIII; J. G. Landels, "The Brauron Aulos," *Annual of the British School at Athens* 58 (1963): 116–19; idem, "Fragments of Auloi Found in the Athenian

Since many of the surviving auloi are in pieces and their reconstruction is conjectural, it is difficult to specify a typical length for the bombyx. A few nearly complete exemplars, however, do exist. The Museum of Greek Archaeology at Reading University preserves a complete aulos that measures ca. 40 cm, including the holmos and hupholmion.[68] The pair of auloi in the Louvre are extraordinarily complete and well preserved; including the holmos and hupholmion, both are 41 cm in length.[69] The two famous Elgin auloi, though not nearly as well preserved as those at the Louvre, are nevertheless quite complete. One is a bit more curved than the other (figure 21). These instruments may not form a pair, but the lengths of their bombykes are similar: 31.1 cm (the straighter of the two) and 34.3 cm. Two hupholmia were found with the Elgin auloi: one is 4.25 cm in length, the other 3.3 cm. If the two were placed together on the bombykes, the total

---

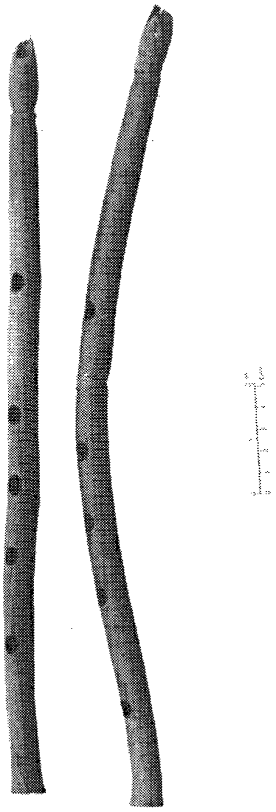
Agora," *Hesperia* 33 (1964): 392–400 and plate 70; idem, "A Newly Discovered Aulos," *Annual of the British School at Athens* 63 (1968): 231–38 and plate 55 (describing an instrument now in the Museum of Greek Archaeology at Reading University); Poul Rovsing Olsen, "An Aulos in the Danish National Museum," *Dansk Aarbog for Musikforskning 1966–67* (1968): 3–9; Despina Masaraki, "Ein Aulos der Sammlung Karapanos," *Mitteilungen des deutschen archäologischen Instituts (Athen.-Abt.)* 89 (1974): 105–21 (describing an instrument in the Athens National Archaeological Museum); Annie Bélis, "Auloi grecs du Louvre," *Bulletin de correspondance hellénique* 108 (1984): 111–22; and idem, "Fragments d'auloi," in *L'Antre corycien II*, Bulletin de correspondance hellénique, supplément 9 (Paris: Boccard, 1984), 176–81.

Spigot-and-socket joints can be seen in all the fragments; separate hupholmia or holmoi appear among the fragments from Meroë, Pompeii, and the Athenian Agora, as well as with the Elgin, Louvre, and Danish National Museum auloi; the instrument of the Reading Museum has a very large hupholmion encased in metal, which was joined to the bombyx by a metal band with a decorative outer layer of silver; bells or flared ends appear in the instruments of the Reading Museum, the Athenian Agora, and Meroë; metal encasement is exhibited in the instruments of Pompeii, the Castellani and Karapanos collections, the Reading Museum, and Meroë; scoring to hold thread on the spigot-and-socket joints appears on the Meroë fragments.

[68] The aulos is made of bone (or ivory) and wood with metallic casing and decoration. It probably dates no earlier than the fourth century B.C.E. The measurements are taken from Landels, "Newly Discovered Aulos." Landels thinks this aulos is one of a pair, but that remains a conjecture.

[69] Louvre, Département des Antiquités Egyptiennes, Inv. E 10962a and b. The auloi, made of sycamore wood, probably date from the fourth century B.C.E. The measurements are taken from Bélis, "Auloi grecs du Louvre."

length would be between 38.65 and 41.85 cm[70]—nearly identical to the Reading and Louvre auloi.



item 1816.6-10.502. ©Copyright the British Museum

Figure 21.

The two auloi preserved in the Danish National Museum in Copenhagen are somewhat shorter than the Elgin, Reading, and Louvre auloi. One pipe is 33.4 cm in length, the other is 35.4; these lengths include the hupholmion.[71] On the other hand, the four Pompeiian auloi preserved in the National Archaeological Museum at Naples are somewhat longer; they range from 53.65 cm to 49.21 cm, and each includes the holmos and a hupholmion.[72] The longest single aulos, measuring 59 cm without a holmos or hupholmion, is found in the Karapanos Collection at the Athens National Archaeological Museum.[73] The range of lengths from ca. 33.5 to ca. 60 cm corresponds quite well to the general proportions exhibited in the vase paintings and sculpture (see figures 2, 3, 11, 13, 18, 22, and 28–30). Most of the auloi are longer than the span of an average forearm and hand with extended fingers, but some are shorter and some much longer.

---

[70] The measurements for these auloi, made of sycamore wood, are those given by Schlesinger (*Aulos*, 411–12, 419); in the case of the shorter aulos, two sets of measurements were made independently by Schlesinger and William Bentley, and no variation in length was discerned. The measurements reported by Howard ("The Αὐλός," 59–60) are, however, somewhat different: the shorter aulos (his Elgin B) is 31.2 cm in length, while Elgin A is 35 cm. The difference of 1 mm in the case of Elgin B is insignificant and could simply have been caused by a change in the humidity; on the other hand, a difference of 7 mm in the case of Elgin A is more difficult to explain. Elgin A does, however, have a marked curvature, and the different lengths can be accommodated by comparing the measurements along the curvature with those on a straight line. The date of the Elgin auloi is uncertain, but they are probably earlier than the Reading aulos.

Once the auloi were developed to include more than four trupemata, it was necessary to find a way to close the holes not needed for a particular performance. Some of the surviving remains of auloi include metal bands encircling the pipe at the location of each trupema, with a hole in each band corresponding to the trupema itself. The bands can be turned so as to open or close the various trupemata of the instrument.[74] It is possible that Horace had these in mind as he referred to a time when the aulos was "not, as now, bound with brass and a rival of the salpinx, but slight and simple."[75] Nevertheless, in view of the fact that many of the surviving auloi are encased in metal and decorated with foil, Horace is probably making a general observation about the overall appearance and sound of the instrument.

---

[71] Copenhagen, Danish National Museum, nos. 14.411 and 14.412. The pipes are made of sheep bone and date probably from the fifth or fourth century B.C.E. Measurements from Olsen, "An Aulos in the Danish National Museum," 6.

[72] Naples, National Archaeological Museum, no. 76891–94. These are made of ivory and probably date from the first century C.E. The measurements are taken from Howard, "The Αὐλός," 48–50.

[73] This is the measurement given by Masaraki, "Ein Aulos der Sammlung Karapanos," 105, although a longer total length is hypothesized by estimating the probable length of the hupholmion and holmos. The aulos is no earlier than the fifth century B.C.E.

[74] The four Pompeiian auloi were originally covered with silver bands. The auloi of the Castellani collection preserved in the British Museum (no. 84, 4–9, 5 and 84, 4–9, 6), the Karapanos aulos, and the auloi of Meroë also exhibit bands. On the aulos of the Reading Museum, a bronze band with a 4-mm hole comes between the holmos and the hupholmion. Landels ("Newly Discovered Aulos," 234) thinks this may be some sort of speaker hole (cf. Landels, "Fragments of Auloi," 394), but see pp. 204–18 *infra*.

[75] Horace *Ars poetica* 202–3. See n. 55 *supra*.

Beginning in the first century B.C.E., the bands began to have little hooks or flanges attached to them, which would assist the performer in turning them more easily and quickly, perhaps even while playing. Among the fragments of auloi found at Meroë in Egypt, one has a long mechanism attached that could be a key for the performer to use in opening and closing a hole near the bottom of the instrument.[76] All these mechanisms certainly enabled the aulete to change and expand the intervallic patterns available on a single aulos and thus to perform the complex, exciting, and virtuosic music so commonly ascribed to the instrument.

The terminology for the mechanisms of these more complex auloi was not clearly defined. In a passage describing the smooth- and rough-breathing marks (' and ') applied in Greek texts to indicate whether or not a vowel is aspirated, Arcadius, a grammarian of the fourth century C.E., seems to be referring to the little hooks as kerata (κἑρατα) or bombykes, perhaps thinking that the hooks looked either like horns or the antennae (κἑρατα) of insects:

> For each breathing, a sign was applied, neither crudely nor rudely. Just as those who discovered the holes on the auloi devised some kerata or bombykes to stop or open the holes whenever they wish by turning them up and down, left and right, so also were these signs—like the kerata for the auloi—made for the breathing, one form signifying each. This particular one seems like the aulos, for turning it left or right shows when to stop or open the breath.[77]

---

[76] Bodley, "Auloi of Meroë," 236–38. Among the fragments of perhaps as many as nine auloi, several have little triangular flanges attached to the rings, each flange with a tiny hole drilled through it. Bodley proposes to use the fragment with the long lever attached to it in the reconstruction of a long "drone pipe" (see his plates VI–VII). His reconstructions, however, are conjectural and have been rejected by J. G. Landels, "The Reconstruction of Ancient Greek Auloi," *World Archaeology* 12 (1981): 298–302.

[77] ἀλλ' ἑκάστῳ πνεύματι οὐκ ἀτέχνως οὐδ' ἀμούσως τὰ σημεῖα ἐπέθετο· καθάπερ οἱ τοῖς αὐλοῖς τὰ τρήματα εὑράμενοι, ἐπιφράττειν αὐτὰ καὶ ὑπανοίγειν ὁπότε βούλοιντο, κέρασί τισιν ἢ βόμβυξιν ὑφορκίοις (ὑφολκίοις) ἐπετεχνάσαντο, ἄνω καὶ κάτω, καὶ ἔνδόν τε καὶ ἔξω στρέφοντες. ταῦτα οὑτωσὶ, κἀκείνοις ὥσπερ κέρατα τὰ σημεῖα ἐποιήσατο τῷ πνεύματι, ἕν τι σχῆμα ἑκατέρῳ σημηνάμενος. τοῦτο δὴ τὸ ἓν ὥσπερ αὐλῷ ἐοικὸς, ὅπερ ἔνδον καὶ ἔξω στρέφων ἐπιφράττειν τε καὶ ὑπανοίγειν τὸ πνεῦμα ἐδίδαξεν (text taken from Howard, "The Αὐλός," 8). Schlesinger, *Aulos*, 74, has a rather garbled translation of this passage. See also Becker, *Entwicklungsgeschichte*, 141–44.

It is clear that the kerata form the principal simile in this passage; Arcadius's use of bombykes is more problematic. In fact, various hooks and tubes are shown on auloi in paintings, mosaics, and bas-reliefs beginning in the first century C.E.,[78] and devices of this sort may well have been in Arcadius's mind. If, as certainly seems to be the case, bombyx was the technical term that referred to the resonator of the aulos, it is possible that it came to refer as well to the tube extensions. The function of these extensions remains uncertain: they could have been handles attached to the bands, they might have served as plugs for some of the holes, or they may have been used to slightly alter the tuning of the instrument.[79] In any event, auloi in the period prior to the first century B.C.E. do not exhibit these contrivances, and the extra trupemata must have been closed ahead of time, either by turning the rings or stopping the holes with wax.

The number and arrangement of the trupemata on auloi varies from instrument to instrument, and. unless the instruments are demonstrably complete, the number of trupemata is of course uncertain. The four Pompeiian auloi have the greatest number of trupemata: two have ten, one has twelve, and another has fifteen; the Karapanos aulos has eleven; one of the Louvre auloi has nine, the other seven; each of the Elgin auloi has six; and each of the Reading and Copenhagen auloi has only five.[80] The trupemata are arranged with one or two on the underside of the instrument and the rest more or less in a line on the top of the instrument, except for the fourth Pompeiian aulos (no. 76894), which does not have an underside trupema.

---

[78] Illustrations in Becker, *Entwicklungsgeschichte*, 136 and 138–40. For a fuller list, see Howard, "The Αὐλός," 9.

[79] Pollux *Onomasticon* 4.80 refers to πλαγίας ἀνοίξας τῷ πνεύματι τὰς ὁδούς (openings on the side as passageways for the breath), and Howard ("The Αὐλός," 10) thinks this must refer to the tube extensions. But since this is the passage in which Pollux refers to Diodorus of Thebes's expansion of the aulos from an instrument with four trupemata to one with "many holes," it is more likely that these lateral openings are merely the additional holes.

[80] The Brauron aulos, which is certainly incomplete, also exhibits six trupemata (see Landels, "Brauron"). The precise spacings of the trupemata are respectively reported in Howard, "The Αὐλός," 48–50; Masaraki, "Ein Aulos der Sammlung Karapanos," tables 50–51; Bélis, "Auloi grecs du Louvre," 113; Howard, "The Αὐλός," 59 (cf. Schlesinger, *Aulos*, 411–20); Landels, "Newly Discovered Aulos," 235–36; and Olsen, "An Aulos in the Danish National Museum," 6–7.

The number, shape, and spacing of the holes has been a matter of some interest to modern scholars, who have supposed that the arrangement might provide a key to recreating the sound of the Greeks' unique musical scales.[81] But in fact, the function of the trupemata depends on the type of reed used in the instrument, and even with a given reed, the pitch of the instrument can be controlled to a very high degree by the performer.[82]

Auloi came in a variety of shapes and sizes. They were usually played in pairs, but a single aulos was used for certain aulema. In the *Deipnosophistae,* Athenaeus notes numerous types of auloi in passing in Book IV, and later, in Book XIV, he refers to Aristoxenus's lost treatise on the boring of auloi, in which five specific classes of auloi are defined: parthenioi (παρθένιοι), or maidens' auloi; paidikoi (παιδικοί), or children's auloi; kitharisterioi (κιθαριστήριοι), or auloi to accompany the kithara; teleioi (τέλειοι), or deep auloi; and hyperteleioi (ὑπερτέλειοι), or very deep auloi.[83] In his *Harmonica* 20–21, Aristoxenus remarks that the distance from the highest note of the parthenioi auloi to the lowest note of the hyperteleioi auloi exceeded a range of three octaves.[84] Pollux's *Onomasticon* assigns the parthenioi, paidikoi, and hyperteleioi auloi to the three primary voice groups of maidens, boys, and men, and notes that the teleioi were used for instrumental pieces such as the Pythic aulema and the accompaniment of dithyrambs.[85]

---

[81] Schlesinger, *Aulos,* in particular, developed an elaborate theory of modal determinants based on equidistant spacing of the holes. Her theory was enthusiastically embraced by Bodley, "Auloi of Meroë," who employed it in his hypothetical reconstructions of the large number of fragments discovered at this site. Howard, "The Αὐλός," predates Schlesinger, but he too hypothesizes scales for the Pompeiian, Castellani, and Elgin auloi. Richard J. Letters ("The Scales of Some Surviving *AYAOI,*" *Classical Quarterly* n. s. 19 [1969]: 266–68) suggests his own set of scales for the two Elgin auloi, the Brauron aulos, fragment D from the Athenian Agora, and the four Pompeiian auloi. Even Landels, though much more cautious than any of the other writers, suggests a scale for the Reading aulos, based on the proportional relationships of its trupemata. Schlesinger's highly complex treatment and theory have not gained general acceptance, but her experiments are reproduceable and the reports are valuable, even if they do not altogether persuade readers to accept her theory of modal determinants and its value in solving difficult problems in ancient Greek music theory.

[82] Aristoxenus himself stresses that the boring of the instrument does not produce certain characteristics; rather, these result from the manipulation of the instrument by the performer (see *Harmonica* [da Rios 51.13–54.10]). Experiments on reproductions of the Reading and Elgin auloi made by Mr. Hodges (see n. 14 *supra* and pp. 204–18 *infra*) clearly demonstrate the extent to which the aulete could control the pitch of any given fingering on the instrument. Landels ("Reconstruction," 300), in noting the various factors that affect pitch on a reed instrument, makes a similar observation when he states: "In the imperfect world of real wood-wind instruments, there is no such thing as a reed which does not have its own quirks and resonances, or a player who does not, on occasion, pull the pitch of the instrument up or down, by accident or fatigue or over-enthusiasm." Landels, however, reflects the typical modern assumption that the ideal for the ancient Greeks would have been an instrument of stable pitch. On the contrary, even as late as the eighteenth century, flexibility of pitch and the concomitant ability of the performer to inflect every note of a musical line were considered highly desirable musical characteristics.

Pollux's *Onomasticon* 4.74–77 also names numerous ethnic species of auloi (αὐλῶν εἴδη) attributed to Libyans, Phrygians, Egyptians, Thebans, and Scythians. Included in the list are the plagiaulos (πλαγίαυλος), the monaulos (μόναυλος), the gingras (γίγγρας), and the elumos (ἔλυμος) aulos.

Descriptions of the plagiaulos would seem to clearly indicate an instrument held horizontally, rather like the modern flute. Both Pollux and Athenaeus attribute the instrument to the Libyans, but it remains unclear whether the plagiaulos was a flue, played by blowing through an opening in the side or at the end of the instrument, or a reed, played by inserting a mouthpiece in a hole in the side of the instrument. Two pipes in the Castellani collection of the British Museum may be representative of this type. One end of one of the pipes is closed, and at that end, a little raised bust of a bacchante is present, with a small hole drilled just above the forehead and inclining towards the open end of the instrument. The other pipe is similar, but as the end by the head of the bacchante is broken, it is no longer stopped. One pipe has six trupemata, the other five.[86] Iconographic evidence indicates that while transverse instruments were rare in Greek culture, they were known in Etruscan and Egyptian culture.[87]

---

[83] Athenaeus *Deipnosophistae* 4.78–84 (175e–185a [Kaibel 1:394–403]) and 14.36 (634e–f [Kaibel 3:400–401]=Aristoxenus fr. 101 [Wehrli 34]). These same five types are included but not attributed to Aristoxenus in the list at 4.79, where Athenaeus adds that the teleioi and hyperteleioi auloi are men's auloi. The aulos in the Karapanos Collection may be an example of a hyperteleios aulos.

[84] τάχα γὰρ ὁ τῶν παρθενίων αὐλῶν ὀξύτατος φθόγγος πρὸς τὸν τῶν ὑπερτελείων βαρύτατον μεῖζον ἂν ποιήσειε τοῦ εἰρημένου τρὶς διὰ πασῶν διάστημα (da Rios 26.8–27.1). Aristotle *Historia animalium* 8.1 (581b11–12) confirms that the parthenioi auloi were of a higher pitch than the paidikoi auloi.

[85] Pollux *Onomasticon* 4.81: τελείους δ' αὐτοὺς ὠνόμαζον, ηὔλουν δὲ τὸ ἄχορον αὔλημα, τὸ Πυθικόν, οἱ δὲ χορικοὶ διθυράμβοις προσηύλουν. καὶ τοῖς μὲν παρθενίοις αὐλοῖς παρθένοι προσεχόρευον, τοῖς δὲ παιδικοῖς παῖδες προσῇδον· οἱ δὲ ὑπερτέλειοι προσεφθέγγοντο ἀνδρῶν χοροῖς (Bekker 161).

The monaulos is associated by Pollux with the Egyptians, who used it for the gamelion aulema, and the Phrygians, from whom the Carians took it and used it for threnody.[88] It is by no means certain, however, that "monaulos" refers to a single pipe; the prefix "mon" may derive from *ma-it*, the general Egyptian term for aulos.[89] Athenaeus, who frequently refers to the monaulos in Book IV of the *Deipnosophistae*, associates it with the plagiaulos and seems to consider it a synonym for the syrinx, or Pan-pipes:

> Araros says in the *Birth of Pan*:
>
> > Snatching up the monaulos, as straight as you could imagine,
> > He leapt up lightly
>
> Anaxandrides says in the *Treasury*:
>
> > Taking up the monaulos, I played the hymenaios.
>
> and in the *Cup-Bearer*:
>
> > Where have you put the monaulos, Syrian?
> > What's a monaulos?
> > The reed.[90]

---

[86] See Howard, "The Αὐλός," 16–17; Schlesinger, *Aulos*, 79. Among the Meroë fragments, one item has an inclined tube attached, which slants upwards towards the open end of the pipe, where a fragment of a hupholmion is still visible. Bodley ("Auloi at Meroë," 231–33) believes this is an extended trupema, not a hole for the insertion of a reed.

[87] Sachs (*History of Musical Instruments*, 141–42 and plate VIIIa) describes and illustrates a rough relief sculpture from an Etruscan tomb of the second century B.C.E. representing a figure playing some type of transverse pipe. It is not possible, however, to determine whether the instrument is a flue or a reed. The source of Sachs's information is Eugenio Albini, "Instrumenti musicali degli Etruschi e loro origini," *L'Illustrazione Vaticana* 8 (1937): 667–71. On Egyptian transverse instruments, see Hans Hickmann, "The Antique Cross-Flute," *Acta musicologica* 24 (1952): 108–12; and idem, "Classement et classification des flûtes, clarinettes et hautbois de l'Egypte ancienne," *Chronique d'Egypte* 26 (1951): 17–27.

[88] Pollux *Onomasticon* 4.75 and 80. On the gamelion aulema, see chapter 2, p. 131; on the Carian music, see chapter 2, pp. 123 and 132 *supra*.

[89] Howard, "The Αὐλός," 13. But see also Henry George Farmer, "The Music of Ancient Egypt," in *Ancient and Oriental Music*, ed. Egon Wellesz, New Oxford History of Music, vol. 1 (London: Oxford University Press, 1957), 269.

[90] Ἀραρὼς δ' ἐν Πανὸς γοναῖς· ἀναρπάσας μόναυλον εὐθὺς πῶς δοκεῖς | κούφως ἀνήλλετο. Ἀναξανδρίδης δ' ἐν Θησαυρῷ· ἀναλαβὼν | μόναυλον ηὔλουν τὸν

A few lines later, he adds that the monaulos is now called the kalamaules (καλαμαύλης)—that is, a reed pipe—and those who play on the reed (τῷ καλάμῳ αὐλοῦντες) are called kalamaulai (καλαμαῦλαι).

The gingras, according to both Athenaeus and Pollux, was a small aulos developed by the Phoenicians with a piercing tone used by the Carians for lamentation. The aulema played on the gingras as well as the accompanying dance also came to be called gingras.[91]

A final type, the elumos—or Phrygian—aulos is described by Pollux as made of box wood and with a curved bell on the end of one of the pipes. The description is confirmed by Athenaeus, and auloi of this sort do indeed appear in frescoes, mosaics, and sculpture beginning in the first century C.E. Hesychius, in his *Lexicon*, adds that the pipe with the bell was played by the left hand.[92] Although the iconography supports only this later date for the elumos aulos, Pausanias recognized the Phrygian aulos as distinct from the Greek when he saw the famous chest in which Cypselus hid to escape the Bacchidae. In one scene on the chest, Pausanias describes Heracles seated on a throne, with a woman behind him, "playing the Phrygian, not the Greek auloi."[93] Aelian, as earlier noted, distinguished between the bores of the Phrygian auloi,

---

ὑμέναιον. καὶ ἐν Φιαληφόρῳ· . . τὸν μόναυλον ποῖ τέτροφας; οὗτος Σύρε. Β. ποῖον μόναυλον; Α. τὸν κάλαμον (175f–176a [Kaibel 1:394–95]).

[91] Pollux *Onomasticon* 4.76 and 102; Athenaeus *Deipnosophistae* 4.76 (174f) and 14.9 (618c). Athenaeus says the pipes were only a hand's span in length. For iconographic evidence, see Giovanni Comotti, "L'aulo *ghingras* in una scena menandrea del mosaico di Dioscuride," *Quaderni urbinati di cultura classica* 20 (1975): 215–23.

[92] Pollux *Onomasticon* 4.74: ἔλυμος τὴν μὲν ὕλην πύξινος, τὸ δ' εὕρημα Φρυγῶν· κέρας δ' ἑκατέρῳ τῶν αὐλῶν ἀνανεῦον πρόσεστιν (Bekker 159–60). Cf. Athenaeus *Deipnosophistae* 4.79 (176f–177a) and 84 (185a); Hesychius, s.v. ἐγκεραύλης. Hesychius was active in Alexandria in the fifth century C.E. See figures 52, 54, and 55 in Becker, *Entwicklungsgeschichte*, 136 and 139–40; and Comotti, "L'aulo *ghingras*," 220–23 and plates 3–4. The only representation earlier than the first century C.E. appears on a marble relief (London, British Museum, no. 817), which perhaps dates as early as the second century B.C.E. The relief shows an aulete playing an elumos aulos and with the kroupezai on his foot. The pipe with the bell is indeed in the player's left hand.

[93] *Graeciae descriptio* 5.17.9: Φρυγίοις δὲ αὐλεῖ καὶ οὐχ Ἑλληνικοῖς αὐλοῖς. Cypselus was tyrant in Corinth ca. 657–27 B.C.E.; the chest, of course, may be a much later monument.

which were unequal, and those of the Greek auloi, which were equal. The surviving iconography of the elumos aulos confirms Aelian's observation: the pipe with the bell is noticeably broader than the other pipe. By contrast, in representations of auloi without curved bells, the two pipes are of identical or nearly identical length and breadth. Such distinctions could have been readily recognized by Pausanias.[94]

Auletes carried their instruments in a special aulos-bag called a subene (συβήνη), aulotheke (αὐλοθήκη), or aulodoke (αὐλοδόκη),[95] which was usually constructed of spotted fawn- or leopard skin. Attached to this bag was a smaller container, the glottokomeion (γλωττοκομεῖον), in which the reeds were carried.[96] Unlike the bombyx itself, aulos reeds could easily be damaged, and as this term is also generally applied to a case or casket, the glottokomeion must have been a small box. The aulotheke and glottokomeion are often shown hanging in the background (see figure 11, for example)—and sometimes from his arm or shoulder—while the aulete is playing. On rare occasions, the auloi can actually be seen in the aulotheke. A red-figure painting by Epiktetos (ca. 520–490 B.C.E.), for example, illustrates an aulete with the aulotheke and glottokomeion slung over his left shoulder. The aulete is already playing, but another pair of auloi, perhaps a spare or instruments for a different tuning, are in the bag (figure 22).[97]

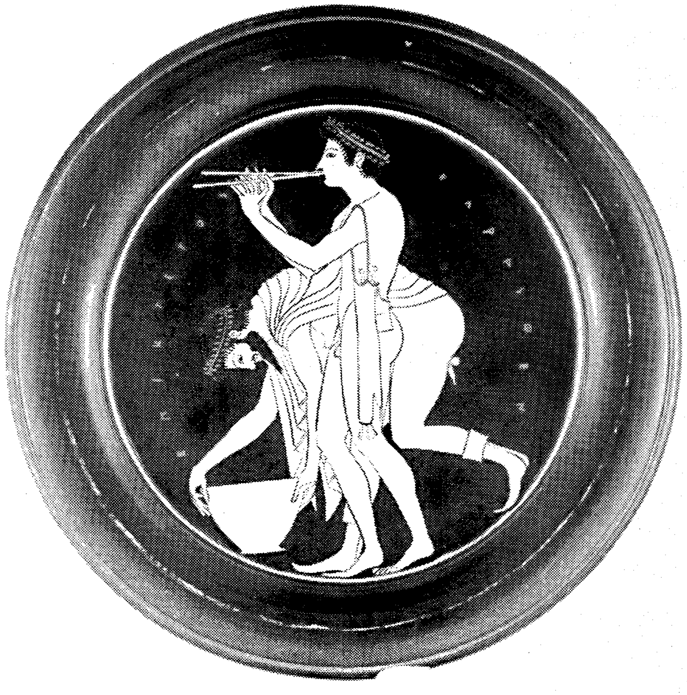
---

[94] For a survey of iconographic and literary evidence about the elumos aulos, see Annie Bélis, "L'Aulos phrygien," *Revue archéologique* 48 (1986): 21–40. Auloi are quite frequently represented in Etruscan art, and an additional type, an "Etruscan aulos," could be conjectured. See, for example, Jean René Jannot, "L'Aulos étrusque," *L'Antiquité classique* 43 (1974): 118–42.

[95] Hesychius, s.v. συβήνη; *Suda*, s.v. συβήνη; *Etymologicon magnum*, s.v. συβήνη (732.25); Pollux *Onomasticon* 7.153 and 10.153.

[96] *Etymologicon magnum*, s.v. γλωττοκομεῖον (235.45–47); Hesychius, s.v. γλωττοκομεῖον. Pollux (*Onomasticon* 10.153–54) considers γλωττοκομεῖον a synonym for συβήνη.

[97] The painting appears in the center of a plate (London, British Museum E 137).



©Copyright the British Museum

Figure 22.

Reeds

As the actual voice of the aulos, the reed is the most important part. No reeds survive, but a considerable amount is known about them from descriptions in Theophrastus's *Historia plantarum* and the Aristotelian *De audibilibus*. In Book IV of the *Historia plantarum*, Theophrastus concentrates on various trees and plants native to particular regions, beginning in chapter 8 to speak of plants that grow in rivers, marshes, and lakes. There are three species of these: trees, herbaceous plants, and plants that grow in clumps. This final species includes the reed (κάλαμος), galingale *phleo* rush sedge—that is, a *Cyperus* reed—which, Theophrastus says, is common to rivers and similar locations.[98] In chapter 10, he turns to plants that are characteristic of Lake Copaïs near Orchomenos,[99] and these include the reed, galingale *phleos* bulrush, both the type used to make auloi and another type. Then, in chapter 11, he concentrates on the reed used for auloi. This reed grows whenever the lake is full, and the deeper the lake, the taller the reed. Tall reeds can be used for the mouthpieces, while those that grew when the water did not remain in the lake could only be used for the bombykes. The aulos reed differs from the other reeds in having a more luxuriant growth: the leaf is broad and white, but the reed has only a small plume. Some aulos reeds, which are called eunuch-reeds (εὐνουχίας), have no plume, and "from these they say the best mouthpieces come, but only a few mouthpieces succeed in their manufacture."[100]

---

[98] λοχμώδη δὲ κάλαμον κύπειρον φλεὼ σχοῖνον βούτομον, ἅπερ σχεδὸν κοινὰ πάντων τῶν ποταμῶν καὶ τῶν τοιούτων τόπων (Theophrastus, *Enquiry into Plants*, 2 vols., ed. and trans. Arthur Hort, Loeb Classical Library [London: William Heinemann, 1916], 1:346).

[99] See map 1, p. 20, just above Thebes in Boeotia.

After describing the optimum season for cutting the reeds to be used in mouthpieces, Theophrastus describes their manufacture:

> When they collected the reeds, they lay them in the open air during the winter in their rind. In the spring, after washing and rubbing them thoroughly, they place them in the sun. In the summer after this, they cut them into knot-to-knot sections and again place them in the open air for some time. On the knot-to-knot section, they leave the knot towards the shoots; the lengths of these are not less than two palms. Now the best lengths of the knot-to-knot sections for making mouthpieces are the middle sections of the reed: the sections towards the shoots make the softest mouthpieces, and those toward the root make the hardest. The glottai from the same knot-to-knot section are consonant, and the others are not consonant. The glotta towards the root is the left glotta, and the glotta towards the shoots is the right glotta. When the knot-to-knot section is cut in two, the mouth of the glotta is, in either case, at the cut of the reed. If the glottai are made in another manner, they are not wholly consonant. Such is the manufacture.[101]

Theophrastus, of course, assumes that his readers have seen aulos mouthpieces and can recall a visual image to complement his text. In the absence of any aulos mouthpieces, the passage becomes more obscure and subject to a number of interpretations.

---

[100] ἐξ ὧν ἄριστα μέν φασί τινες γίνεσθαι τὰ ζεύγη, κατορθοῦν δὲ ὀλίγα παρὰ τὴν ἐργασίαν (Hort 370).

[101] ὅταν συλλέξωσι τιθέασιν ὑπαίθριον τοῦ χειμῶνος ἐν τῷ λέμματι· τοῦ δ' ἦρος περικαθάραντες καὶ ἐκτρίψαντες εἰς τὸν ἥλιον ἔθεσαν. τοῦ θέρους δὲ μετὰ ταῦτα συντεμόντες εἰς τὰ μεσογονάτια πάλιν ὑπαίθριον τιθέασι χρόνον τινά. προσλείπουσι δὲ τῷ μεσογονατίῳ τὸ πρὸς τοὺς βλαστοὺς γόνυ· τὰ δὲ μήκη τὰ τούτων οὐ γίνεται διπαλαίστων ἐλάττω. βέλτιστα μὲν οὖν εἶναι τῶν μεσογονατίων πρὸς τὴν ζευγοποιΐαν ὅλου τοῦ καλάμου τὰ μέσα· μαλακώτατα δὲ ἴσχειν ζεύγη τὰ πρὸς τοὺς βλαστούς, σκληρότατα δὲ τὰ πρὸς τῇ ῥίζῃ· συμφωνεῖν δὲ τὰς γλώττας τὰς ἐκ τοῦ αὐτοῦ μεσογονατίου, τὰς δὲ ἄλλας οὐ συμφωνεῖν· καὶ τὴν μὲν πρὸς τῇ ῥίζῃ ἀριστερὰν εἶναι, τὴν δὲ πρὸς τοὺς βλαστοὺς δεξιάν. τμηθέντος δὲ δίχα τοῦ μεσογονατίου τὸ στόμα τῆς γλώττης ἑκατέρας γίνεσθαι κατὰ τὴν τοῦ καλάμου τομήν· ἐὰν δὲ ἄλλον τρόπον ἐργασθῶσιν αἱ γλῶτται, ταύτας οὐ πάνυ συμφωνεῖν· ἡ μὲν οὖν ἐργασία τοιαύτη (Hort 372).

In order to form a clear sense of Theophrastus's meaning, careful attention must first be paid to each term, and the passage must then be compared with other descriptions of the mouthpiece. The first part of the description is clear: the reeds are cut close to the roots and then seasoned in the open air. The washing and rubbing, of course, cleans them and removes some of the rind. When the reeds are cut into sections, Theophrastus does not suggest—as may at first appear to be the case[102]—that the cuts be made through the knots; this would in any case be quite difficult to accomplish without splitting the reed or cracking the knot. Rather, he observes that the cuts are made just above each knot. This leaves a knot on the top end of each section—the end towards the shoots—and opens the inside of the reed to the air. Although Theophrastus does not say so, any residual reed left above the knot must then have been trimmed off, leaving the knot to form a smooth knob at the top of each reed section. After this, the sections are left to season once again, no doubt to dry the inside of each section. In his careful use of singular and plural terms, Theophrastus is very clear that each single reed is considered to have several middle sections, and that these middle sections are the best for making mouthpieces (ζευγοποιΐα). From each reed, several mouthpieces (ζεύγη) can be made: mouthpieces made from the sections nearer the top of the reed will of course be softer, while those from sections nearer the bottom will be harder. When the sections are fully seasoned and the proper ones have been selected, the mouthpiece can actually be cut. Theophrastus employs an additional term in this part of his discussion: glotta (γλῶττα), or tongue. He states that glottai from the same section of the reed are consonant, and as the sections are "not less than two palms" in length, it is quite reasonable to assume that two mouthpieces could be cut from each section: the one from the bottom half is used for the left pipe of the aulos, the other for the right.

At first, it seems that Theophrastus changes his terminology in the middle of the description, but in fact he is being very careful in his use of terms. When speaking of the mouthpiece in general terms, he uses ζεύγη; when he speaks of the sound made by the mouthpiece, he uses γλῶττα. It is, after all, the glotta—or tongue—that produces the sound and will determine whether the mouthpieces are consonant or not. Theophrastus also refers to the

---

[102] And as Becker (*Entwicklungsgeschichte*, 52) thinks.

"mouth of the glotta," which he says is the point where each section of the reed is cut in two to form the two mouthpieces. If, as seems reasonable, the "mouth of the glotta" is the opening from which the sound emerges, the center of each reed section will become the bottom of each mouthpiece, the part inserted into the holmos. The glotta on the top half must then be cut down from the top—that is, from some point below the knot—while the glotta on the bottom half must be cut up from the bottom (figure 23).

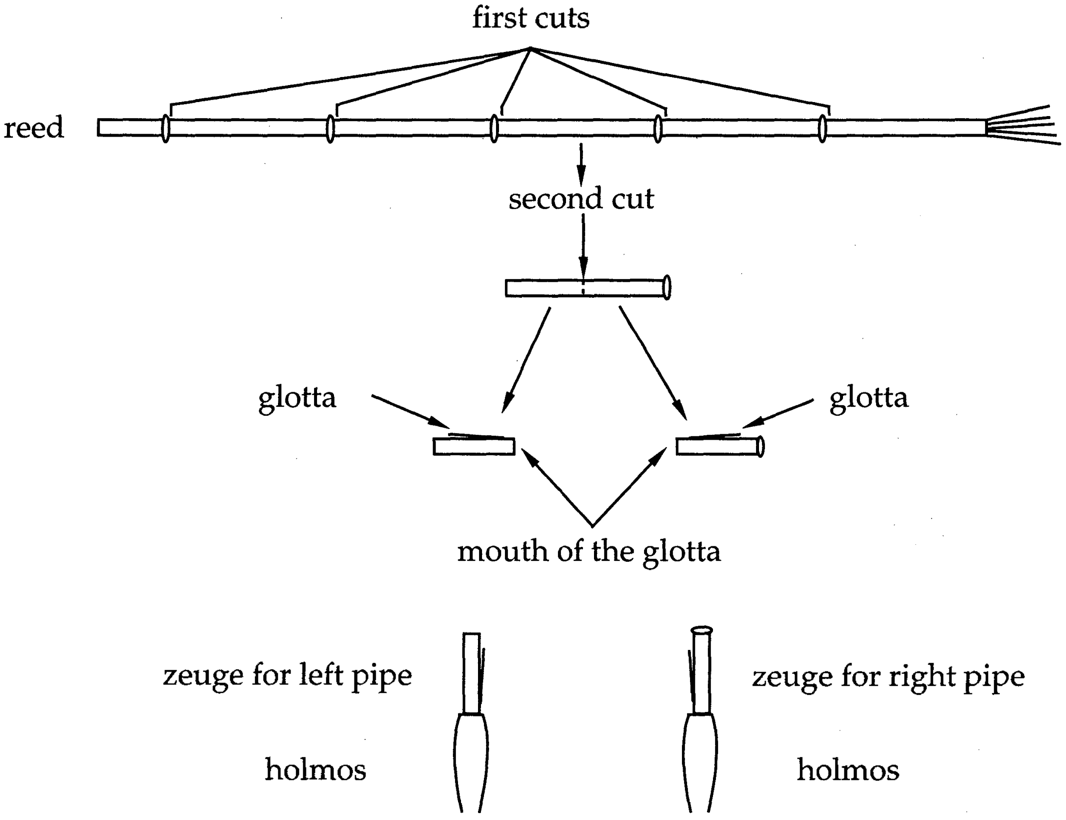

first cuts
reed
second cut
glotta
glotta
mouth of the glotta
zeuge for left pipe
zeuge for right pipe
holmos
holmos

Figure 23.

Theophrastus previously referred to the mouth of the glotta in his comment on the seasons in which the reed was cut. He observed that when the aulos was still being played in an unformed style—that is, until the time of Antigenidas at the end of the fifth century B.C.E.—reeds were cut at the end of the summer, but when it began to be played in a trained style, the reeds were cut around the time of the summer solstice. Reeds cut later in the year would, of course, be harder and have a thicker wall, which would tend "to close the mouth of the glottai."[103] This meant that they would have to be seasoned for many years, after which they would still need considerable work before they could be used on an aulos. By contrast, reeds cut earlier in the year needed only three years' seasoning and a small amount of work before they could be used on the aulos.

There is no place in this passage stating precisely how the mouthpieces are sealed on their top ends. If the original knot remains, it might seal the top of the top half. The top of the bottom half, however, which was originally the bottom of the reed section, must have been sealed with wax or some other material. Figure 24 illustrates small reed mouthpieces—their tops sealed by the knot—in comparison to modern bassoon and oboe reeds.

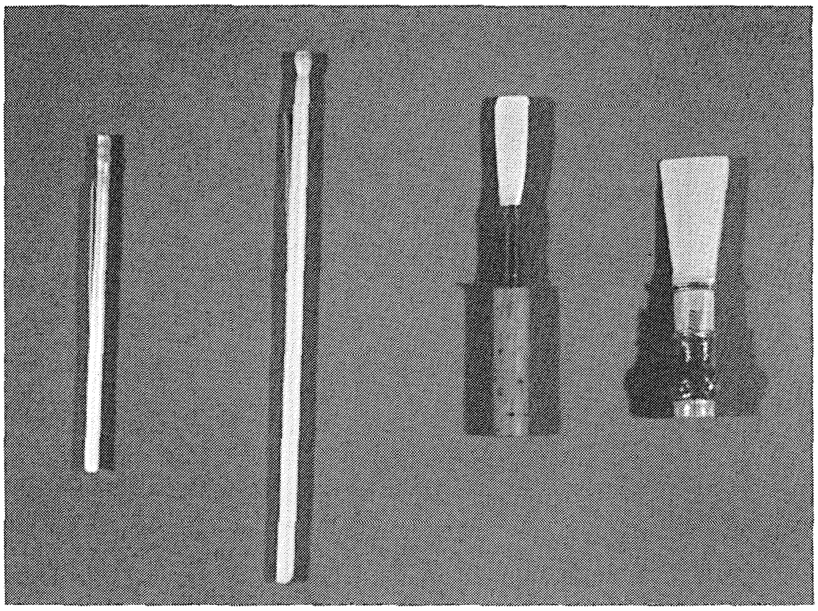


Figure 24.

The mouthpiece of the aulos is also mentioned in three sections of the Aristotelian *De audibilibus*. In the second of these, the glotta is characterized:

---

[103] συμμύειν δὲ τὸ στόμα τῶν γλωττῶν (Hort 370). This phrase is followed by a second phrase, ὃ πρὸς τὴν διακτηρίαν εἶναι χρήσιμον, but the meaning of πρὸς τὴν διακτηρίαν is uncertain. Pliny, who translates this entire section in *Naturalis historia* 16.168–72, renders the passage as "quod erat illis theatrorum moribus utilius," and Hort accordingly translates the phrase as "which is a good thing for the purpose of accompaniment." Nevertheless, the thrust of the whole passage would seem to suggest that the text should read ὃ πρὸς τὴν διακτορίαν εἶναι ἀχρήσιμον, or "which is useless for service."

> It is necessary that the glottai of the auloi be solid, smooth, and even, so that the breath that passes over them is also smooth, even, and unbroken. On this account, those of the mouthpieces that have been soaked and have absorbed saliva are more euphonious, while dry ones are cacophonous. The air is carried softly and evenly through what is wet and smooth. This is evident, for when it is wet, the breath itself beats against the mouthpiece and is broken to a much lesser degree; but dry breath is more restrained and makes a harder impact because it is forced.

Later, it is observed that if "one presses on the mouthpiece, the sound becomes much higher and thinner."[104] Like Theophrastus, the Aristotelian *De audibilibus* is very careful about the terminology: ζεύγη is used to speak of the mouthpiece in general; γλῶττα is used to describe the part of the mouthpiece on which the breath acts to create sound.

Although the mouthpieces in figures 23–24 are shown with a single beating reed, neither the *Historia plantarum* nor *De audibilibus* precisely specifies how the glotta is cut. The literary evidence has been interpreted to refer to a double reed or to a single beating reed.[105] Since the term ζεύγη is a plural form and implies a yoke or something yoked, it can be argued that a double reed is intended. On the other hand, γλῶττα is a singular form, and a single beating reed is much more like a tongue than a double reed, whether wide or narrow. In addition, with a single exception, the phrase "the mouth of the glotta" (τὸ στόμα τῆς γλώττης) always uses the singular γλώττης, that is, one tongue. In the case of a single beating tongue cut in the side of a reed, the glotta and the reed must still be yoked, either by the natural hinge if the cut is made on only three sides or perhaps by waxed thread, which could also be used to insure a tight fit in the holmos.

---

[104] Δεῖ δὲ καὶ τῶν αὐλῶν εἶναι τὰς γλώττας πυκνὰς καὶ λείας καὶ ὁμαλάς, ὅπως ἂν καὶ τὸ πνεῦμα διαπορεύηται δι' αὐτῶν λεῖον καὶ ὁμαλὸν καὶ μὴ διεσπασμένον. διὸ καὶ τὰ βεβρεγμένα τῶν ζευγῶν καὶ τὰ πεπωκότα τὸ σίαλον εὐφωνότερα γίγνεται, τὰ δὲ ξηρὰ κακόφωνα. ὁ γὰρ ἀὴρ διὰ ὑγροῦ καὶ λείου φέρεται μαλακὸς καὶ ὁμαλός. δῆλον δέ· καὶ γὰρ αὐτὸ τὸ πνεῦμα, ὅταν ἔχῃ νοτίδα, πολὺ ἧττον προσκόπτει πρὸς τὰ ζεύγη καὶ διασπᾶται· τὸ δὲ ξηρὸν μᾶλλον ἀντιλαμβάνεται καὶ τὴν πληγὴν ποιεῖται σκληροτέραν διὰ τὴν βίαν (Bekker 802b19–28); καὶ γὰρ ἂν πιέσῃ τις τὰ ζεύγη, μᾶλλον ὀξυτέρα ἡ φωνὴ γίγνεται καὶ λεπτοτέρα (Bekker 804a13–14).

[105] Cf., for example, Howard ("The Αὐλός," 21–28, and idem, "Mouthpiece"), who insists on a double reed; Schlesinger, *Aulos*, 65–66, who concludes that a single beating-reed is described; and Becker, *Entwicklungsgeschichte*, 51–80, who provides a detailed review of both options and decides in favor of a single beating-reed.

The first section on the mouthpiece in *De audibilibus* provides an important clue that the aulos was played with either type of reed. After noting that sounds fade as the air that carries them is dispersed, the treatise adds:

> This is evident in auloi. Those of the mouthpieces that have tongues on the sides emit a softer sound but not equally clear. For the breath, as it is being carried along, falls directly into a wide space and is no longer carried intense and compressed but scattered. In the case of glottai that clap together, the sound is harder and clearer, if one presses them more tightly with the lips, because the breath is then carried with more force.[106]

It has been proposed that the first part of this passage refers to the plagiaulos,[107] but the text clearly refers to the mouthpieces, not the auloi, as having side tongues. The second part of this passage describes tongues that clap together,[108] which is an apt way to refer to double reeds. Moreover, double reeds do produce a harder and clearer sound when they are compressed by the lips. By contrast, a beating tongue cut into the side of a reed is principally affected by the point at which it is compressed rather than by the extent of the compression.[109]

Reconstruction and performance practice

The literary, iconographic, and archaeological sources provide more than enough data to enable the reconstruction of some auloi in order to determine characteristics—timbre, for instance—and performance techniques that remain unclear or are not otherwise known. From these data, various prototypes can be constructed and played with the different types of mouthpieces suggested by the ancient technical descriptions. When particularly satisfactory prototypes are discovered, finished reconstructions can also be made and subjected to ongoing experiment. Figure 25 illustrates prototypes of a number of pipes and reeds.

---

[106] δῆλον δ' ἐστὶ κἀπὶ τῶν αὐλῶν. τὸ γὰρ ἔχοντα τῶν ζευγῶν τὰς γλώττας πλαγίας μαλακωτέραν μὲν ἀποδίδωσι τὴν φωνήν, οὐχ ὁμοίως δὲ λαμπράν· τὸ γὰρ πνεῦμα φερόμενον εὐθέως εἰς εὐρυχωρίαν ἐμπίπτει, καὶ οὐκέτι φέρεται σύντονον οὐδὲ συνεστηκός, ἀλλὰ διεσκεδασμένον. ἐν δὲ ταῖς συγκροτωτέραις γλώτταις ἡ φωνὴ γίνεται σκληροτέρα καὶ λαμπροτέρα, ἂν πιέσῃ τις αὐτὰς μᾶλλον τοῖς χείλεσι, διὰ τὸ φέρεσθαι τὸ πνεῦμα βιαιότερον (Bekker 801b34–40). I am reading συγκροτωτέραις for Bekker's σκληροτέραις.

[107] Howard, "The Αὐλός," 16.

[108] The reading of the text at this point is problematic. The manuscripts have συγκροτέραις, Bekker reads σκληροτέραις, and Düring (71.16) reads συγκροτητικαῖς. I am reading συγκροτωτέραις with Hett and others.

[109] See pp. 207–18 *infra*.

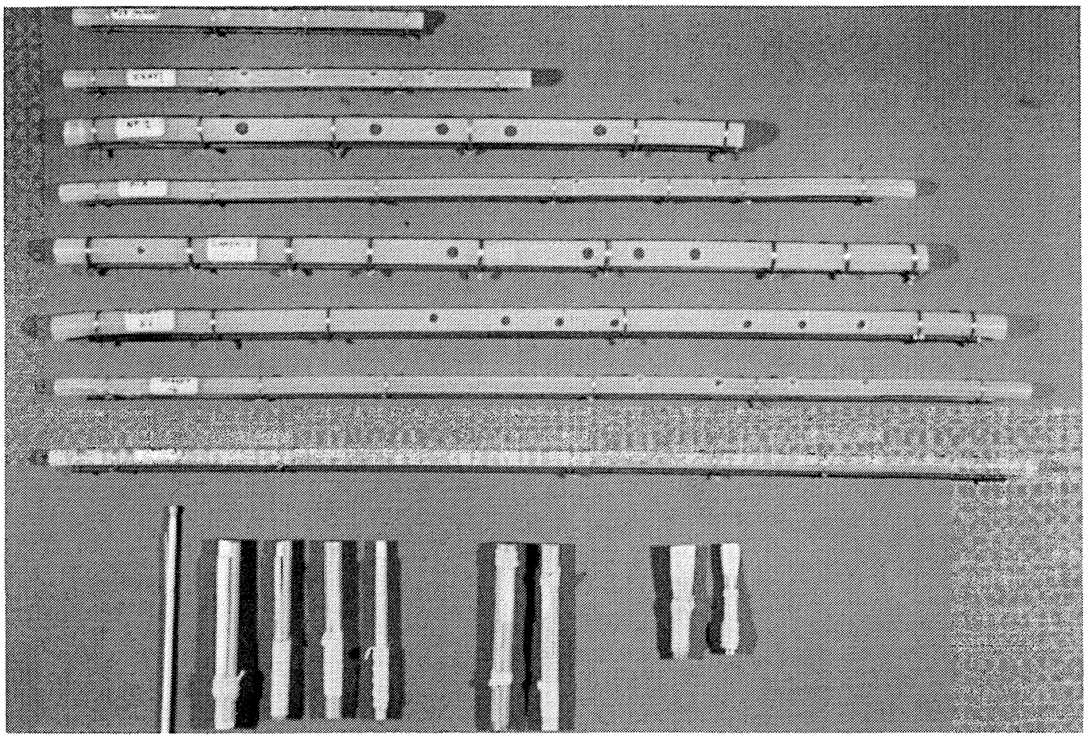


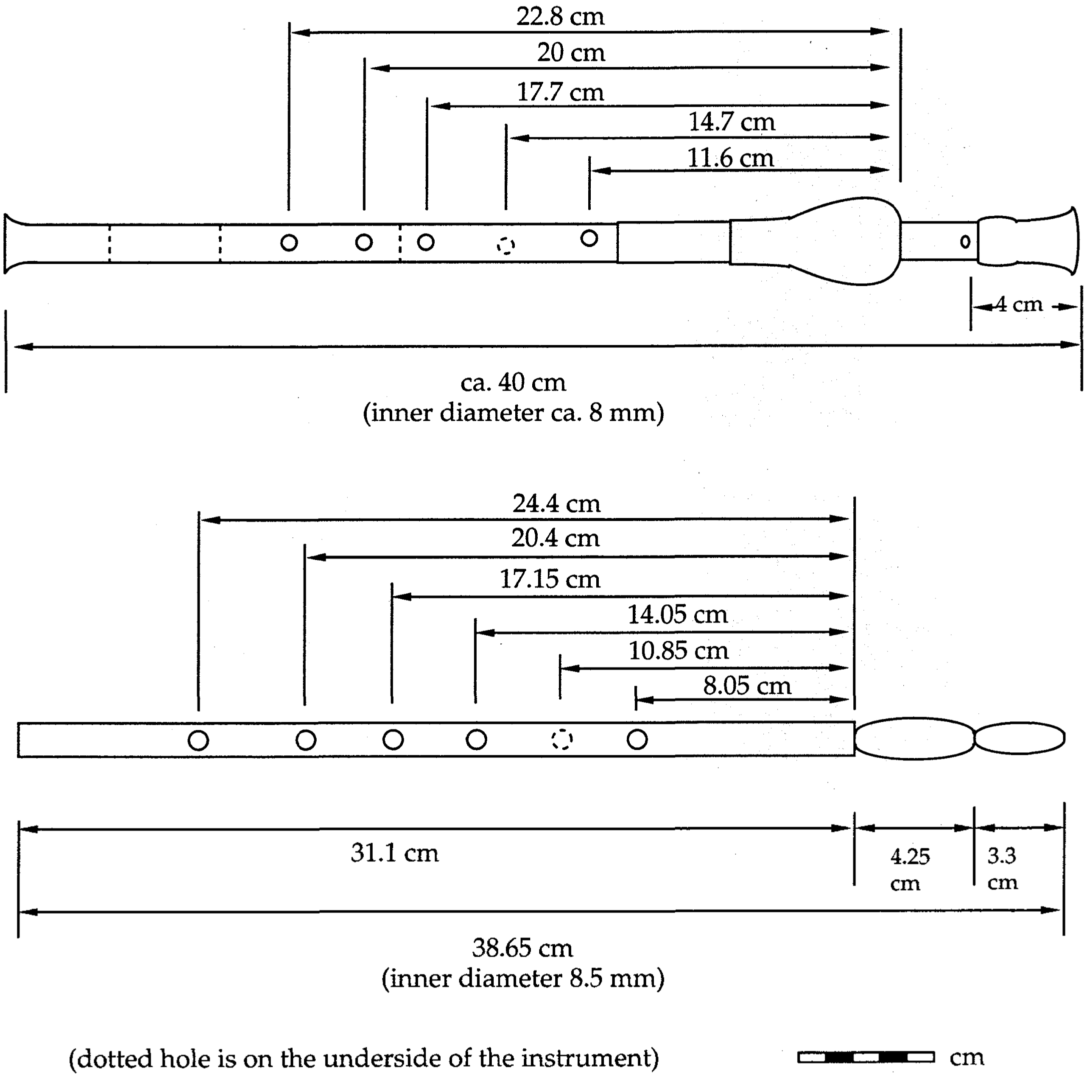
Figure 25.

Figures 26 and 27 show measurements and finished reconstructions of the Reading aulos and the shorter of the two Elgin auloi.[110] Both were made in pairs, although this is purely hypothetical. There is, of course, no evidence that the Reading aulos is only one half of a pair or that the two Elgin auloi did not themselves form a pair. Nevertheless, as certain characteristics of the aulos could only be tested with a pair, pairs were made.[111]

---

[110] Based on measurements reported by J. G. Landels and Kathleen Schlesinger (see nn. 68 and 70 *supra*). Landels's measurements are not as precise as one might wish, but they have been followed as closely as possible.

[111] The prototypes and reconstructions were made by Mr. Hodges (see n. 14 *supra*).


22.8 cm
20 cm
17.7 cm
14.7 cm
11.6 cm
4 cm
ca. 40 cm
(inner diameter ca. 8 mm)
24.4 cm
20.4 cm
17.15 cm
14.05 cm
10.85 cm
8.05 cm
31.1 cm
4.25 cm
3.3 cm
38.65 cm
(inner diameter 8.5 mm)
cm

(dotted hole is on the underside of the instrument)

Figure 26.

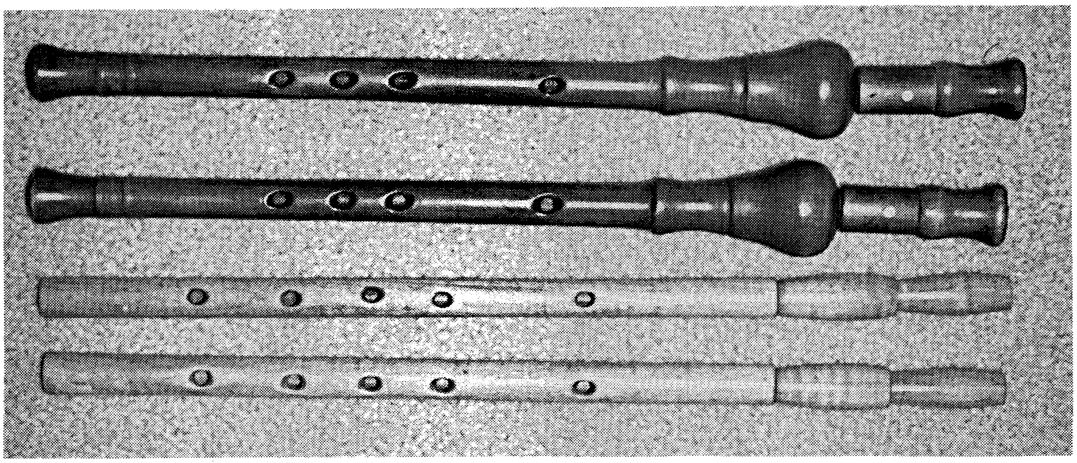


Figure 27.

Any of the prototypes can be played with a single beating reed or with a double reed, but each reed, of course, produces quite different effects. It would be impossible to report every detail of the effects that can be produced on the two reconstructions, but some matters are of particular importance, inasmuch as they bear on issues of tuning and performance practice.[112]

A few reasonable dimensions can be deduced for the single beating-reed mouthpiece. If the mouthpiece is approximately one palm's breadth in length, as may certainly be inferred from Theophrastus's description, and if approximately 4 cm of the mouthpiece should be inserted in the holmos to give it sufficient support in the instrument, the glotta itself might be as long as 4 cm. This, however, makes a rather long tube to take into the mouth, and in practice, the glottai were probably no longer than 35 mm. The outer diameter of a mouthpiece for the Reading or Elgin auloi must be no more than 8 mm, the inner diameter of the Reading aulos, or a bit less. A reed of this diameter from which a mouthpiece could be constructed has a wall about 1 mm thick, but because a reed is round rather than square, the glotta must be cut across the top of the round, not though the center. In consequence, the actual width of a glotta is not the diameter less the thickness of two walls, but something closer to 5 mm.

A glotta of 35 × 5 mm, properly voiced,[113] can produce by itself at least an octave of pitches, depending on the point at which it is stopped by the aulete's lips or teeth. When it is inserted into a bombyx, both the pitch and the response of the mouthpiece are altered by the longer air column. For example, the pitch produced by the mouthpiece alone, with the full length of the glotta allowed to vibrate, is at least an octave higher than a pitch that can be produced by the same mouthpiece in the Elgin reconstruction, played with all the trupemata closed. When a glotta of these dimensions voiced to produce c' is placed in the Elgin reconstruction with both the hupholmion and holmos, the pipe can produce the following approximate pitches as the six trupemata are closed one by one: a (all holes open), g♯, g, f♯, f, e, e♭. If the same reed is used in the Elgin reconstruction with the holmos but without the hupholmion, the pitch is between a tone and a minor third higher, and the distance between the intervals is somewhat greater: c' (all holes open), a♯, a, g♯, g, f♯, f. Once again, the same glotta used in the Reading reconstruction produces these approximate pitches as the five holes are closed one by one: a (all holes open), g♯, g, f♯, f, e♭. The approximate nature of these pitches must be stressed: depending on the slightest movement of the embouchure, any of them can be raised or lowered at least 25 cents, and a somewhat greater movement of the embouchure can alter the pitch by 50 cents or more.[114]

---

[112] The following paragraphs are based on my own experiments with the reconstructions and with various mouthpieces. Pitch readings and variations in cents are derived from playing the reconstructions into a calibrated tuning scope. Pitch symbols, which are based on an A of 440 Hz, follow the standard notation of c' as "middle c," with c the octave below, c" the octave above, and so on.

[113] Cf. Theophrastus's reference (*Historia plantarum* 4.11 [Hort 370]) to the καταύλησις or προκαταύλησις that must be applied to the reed before it can be used in the aulos. This process must involve shaving the glotta to make it somewhat thinner than the wall of the reed and shaping it to make it curve slightly outwards. The reed must be thin enough to vibrate, yet thick enough to be resilient. The process of shaving and shaping the reed is not always successful; sometimes the reed breaks, and sometimes its sound is just not satisfactory. Thus, as Theophrastus observed, "only a few mouthpieces succeed in their manufacture" (see pp. 199 and 203 *supra*).

Measurements for the double-reed mouthpiece may be similar, but there is no specific literary evidence. A double-reed mouthpiece formed from the same reed used for the single beating-reed mouthpiece (i.e., one 8 mm in diameter) could form a double reed as broad as 12 mm at the top. When a double reed of 22 × 12 mm voiced to e'' is used in the same reconstructions, the intervals will be somewhat larger, closer to a whole tone of 200 cents. On the Elgin reconstruction with both the hupholmion and holmos, the pipe can produce the following approximate pitches as the holes are closed one by one: g♯' (all holes open), f♯', e', d', c'. If the same mouthpiece is used in the Elgin reconstruction with the holmos but without the hupholmion, the pitch is between a tone and a minor third higher, and the distance between the intervals is somewhat greater. The same mouthpiece used in the Reading reconstruction produces approximately the same pitches as the Elgin reconstruction with the hupholmion and holmos. Once again, the approximate nature of these pitches must be stressed: like the single beating reed, the double reed can be affected by the embouchure to raise or lower its pitch by a substantial amount.

---

[114] There are 1200 cents in an octave; 100 cents is therefore equal to a half tone in an equal-tempered scale.

It is hardly surprising that the sequence of approximate pitches generated by both the Reading aulos and the Elgin aulos (with the hupholmion and holmos) is nearly identical: both instruments have nearly identical lengths, and as shown in figure 26, the placement of the first four trupemata is also very similar.[115] The fact that two auloi of very different external quality and appearance should have had their first four trupemata bored to such similar dimensions is quite noteworthy. It suggests that there was indeed some standard measure used by aulos makers, at least for the simpler types of instruments.

The hypothetical scales that have been proposed for these instruments by various scholars, with highly precise measurements supplied in cents, are simply unrealistic. The rough ratios between the trupemata and the mouthpiece do correspond to the **possible** ratios between the pitches produced by those trupemata,[116] but it is clear that any given fingering on the aulos can be used to produce a number of pitches. Indeed, Proclus, in his commentary on Plato's *Alcibiades*, confirms this phenomenon:

> Each trupema of the auloi emits, they say, at least three notes—or more, if the paratrupemata are open.[117]

---

[115] If the first hole of both instruments is taken as a beginning point, the second hole of the Reading aulos is only 3 mm lower than that of the Elgin aulos, the third hole is only 1 mm lower, and the fourth hole is 7 mm higher.

[116] See Howard, "The Αὐλός," 60; Schlesinger, *Aulos*, 412–19; and Landels, "Newly Discovered Aulos," 236. Howard, using a small modern clarinet mouthpiece on the Elgin aulos, reports a full chromatic ninth by half-opening and full-opening the trupemata. This phenomenon is reproduceable, but it requires a good deal of manipulation by the performer and does not represent the "natural" pattern of the instrument's boring. Schlesinger reports a variety of patterns, depending on the modal determinant (see n. 81 *supra*), and these demonstrate that the size of the ideal interval of any given trupema is—among other things—a function of its ratio to the other trupemata and the mouthpiece. This is quite true: with the exception of the final interval produced by closing all the holes, the size of the interval is smaller as one moves down the pipe. Landels proposes a hypothetical fourth between the pitch produced from the bottom trupema and that from the thumb hole, but acoustics of reed pipes are not this simple (see Schlesinger, *Aulos*, chapter 3) and do not function like a single vibrating string. Moreover, the type of reed as well as its length affects the result. Landels ("Reconstruction") later acknowledged some of these problems.

[117] ἕκαστον γὰρ τρύπημα τῶν αὐλῶν τρεῖς φθόγγους, ὥς φασι, τοὐλάχιστον ἀφίησιν, εἰ δὲ καὶ τὰ παρατρυπήματα ἀνοιχθείη, πλείους (Proclus, *Sur le Premier Alcibiades de Platon*, 2 vols., ed. and trans. A. Ph. Segonds, Collection des Universités de France [Paris: Les Belles Lettres, 1985–86], 2:255). The meaning of

The consonant ratios between the pipes of the syrinx and the strings of triangular psalteria form the subject of the Aristotelian *Problemata* 19.23 (919b1–14), but in the center of the problem, a single passage adds, somewhat obscurely, that "in auloi, the octave is taken at the duple interval, and the aulos-borers so take it."[118] The passage, however, is misleading: on the syrinx, which is a simple flue, the duple interval can be produced by two pipes in the ratio of 2:1; but on the aulos, the duple interval is produced by an interaction of the reed and the length of the resonator. Halving the length of the bombyx will not produce an octave, although it may appear visually that the aulete produces octaves by opening a trupema around the middle of the pipe. No doubt the passing reference to the aulos was included, perhaps as an afterthought, in an attempt to present all the instruments—flue, reed, and string—as manifesting the mathematical principles of harmonics in the same visual manner.

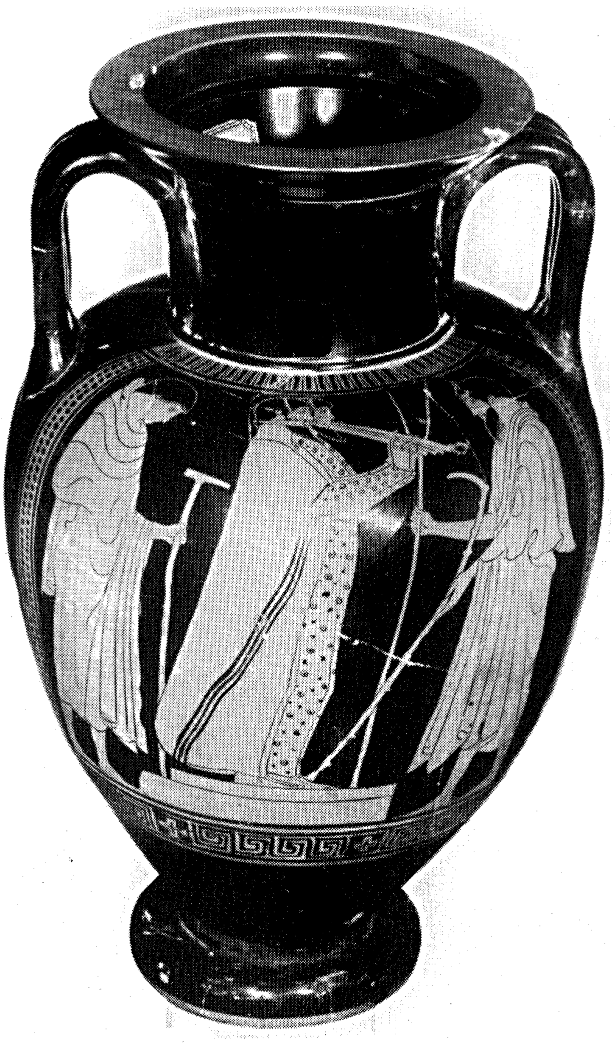
The spacing of the trupemata on the auloi does not allow all of them to be closed simultaneously by the aulete's hand, with the possible exception of the Reading aulos. Even in this case, a very large hand would be required to span the distance between the first and fifth trupemata—slightly more than 11 cm—with the index and fifth fingers, both of which would have to be curled for the thumb to cover the hole on the underside of the instrument. In the case of any aulos with five or more holes, if the aulete covered the upper trupemata with his hand, the lower trupemata would function as vents to establish the bottom note of the instrument. Plugging or unplugging them could alter this "pedal tone." On the other hand, it is also possible that one or more of the upper trupemata were sometimes plugged, and the aulete played on the lower trupemata. The spacing of the trupemata on the Elgin auloi, for instance, would allow the fingers to cover trupemata 1–4, 2–5, 3–5, or 4–6. In every case, it is necessary to curve the fingers and place them on the bombyx at an angle, and this

---

"paratrupemata" is unclear, but it may be the term for the bands that can be turned to open and close certain of the trupemata. On the three notes, see p. 217 *infra.*

[118] ἔτι ἐν τοῖς αὐλοῖς τῷ διπλασίῳ διαστήματι λαμβάνεται τὸ διὰ πασῶν, καὶ οἱ αὐλοτρῦπαι οὕτω λαμβάνουσιν (Jan 91.2–4). On the psalteria, see pp. 270–85 *infra.*

somewhat awkward position is captured by a number of the vase painters (see figures 11, 16, and 30 for example).[119]



Laboratorio fotografico della Soprintendenza Archeologica delle Province di Napoli e Caserta

Figure 28.

Both mouthpieces produce a full and quite resonant timbre, but the single beating-reed mouthpiece produces a much louder tone, lower pitches, and abundant harmonics.[120] Although the tone of the beating reed is not as clear as that of the double reed, just as the Aristotelian *De audibilibus* (801b34–40) observed, it has sufficient power to be used in outdoor performances. A pair of auloi playing in a procession or in the theatre would be quite audible, and if more than one aulete were playing, the sound could be quite penetrating. In fact, auletes are occasionally represented in duets, as on the red-figure amphora of the Pan-painter (figure 28).[121]

---

[119] Bélis, "Auloi grecs du Louvre," 115, describes this same position.

[120] Schlesinger, *Aulos*, 106–10, explains the acoustics of this type of reed. The timbre of the instrument is nothing like that of the modern oboe, clarinet, or bassoon. It does bear some resemblance to the tone of the Roumanian *taragato* or the Sardinian *launedda*.

The pitch of the instrument and thus the base intervals produced by the trupemata depend on the length and voicing of the reed—especially the single beating reed. Theophrastus was right to note that only those mouthpieces fashioned from the same reed section would be consonant; if the mouthpieces are fashioned from sections of different lengths or textures, the dimensions of their glottai would differ, and this will alter their fundamental pitch and timbre. To some extent, the differences can be lessened by careful voicing, but the compromise may render two mediocre mouthpieces in place of a good one and a bad one. Even good reeds will require some adjustment every time they are played. This is rarely illustrated, but in a scene of Musaeus and the Muses painted on a red-figure amphora (ca. 440 B.C.E.),[122] one of the Muses is shown either pressing the mouthpiece into the aulos or flexing the reed with her index finger to soften it prior to playing, while the other Muse is already playing the trigonon, a triangular harp. Musaeus stands to the side with his chelys lyre (figure 29).

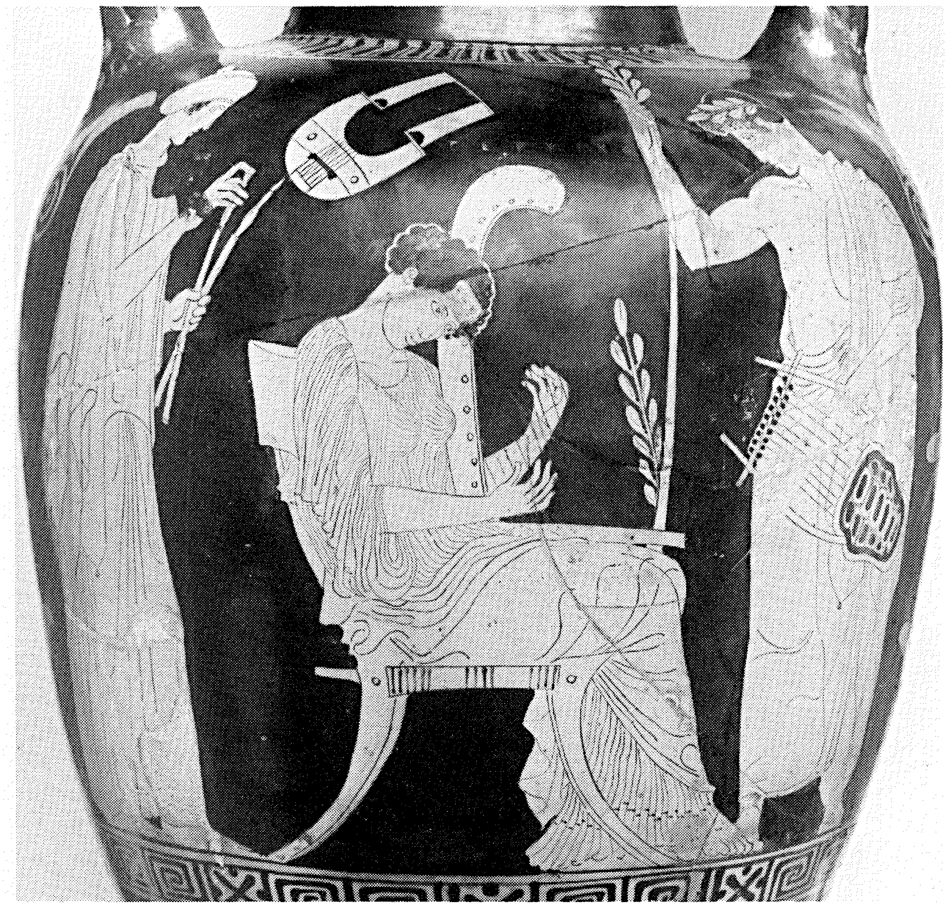
The pitch of the double reed is, of course, susceptible to increased wind pressure, and it easily overblows the octave. The pitch of the single beating reed, by contrast, is not susceptible to overblowing,[123] but it is very responsive to a shortening or lengthening of the glotta by the lips interrupting its vibration at various points. The Reading aulos has—in addition to the five trupemata on the bombyx—a small 4 mm hole just below the holmos. A metal band surrounds this part of the instrument and possesses a corresponding hole; thus, the hole can be opened or closed by rotating the band. The function of this hole is uncertain. If it is open with the single beating-reed mouthpiece on the instrument, the fundamental pitch of the mouthpiece itself sounds and the lower trupemata no longer function. On the other hand, if it is open with the double-reed mouthpiece on the instrument, overblowing is somewhat facilitated. If it was intended as a kind of speaker-hole, the manner in which it might be operated by the aulete while playing is difficult to envision, though it could, of course, be set in advance to make the mouthpiece speak in the register and manner desired by the aulete.

---

[121] Painted in the second quarter of the fifth century B.C.E. Naples, Museo nazionale Stg. 225.

[122] London, British Museum E 271.

[123] Though its ability to speak at all certainly does depend on carefully controlled wind pressure.



©Copyright the British Museum

Figure 29.

Devices employed by the aulete to raise and lower the pitch of an aulos are described or suggested in a number of passages by Aristotle, Aristoxenus, and Plutarch. Here again, the meaning of these passages relies on the interpretation of special terminology. Three terms are of particular importance: syrinx, anaspan (ἀνασπᾶν), and kataspan (κατασπᾶν).

As noted earlier, Aristoxenus comments in the *Harmonica* (21) on the range between the highest and lowest of the five types of auloi, which exceeds three octaves. He adds:

> When the syrinx is drawn off, the highest note sounded on the syrinx to the lowest note sounded on the aulos would make an interval greater than the aforesaid interval [i.e., the triple octave].[124]

The interpretation of this passage relies on the meaning of kataspan and syrinx. In the first clause, Aristoxenus employs a passive form of the verb *kataspan* (κατασπασθείσης), which refers to drawing something down or off. The syrinx, when drawn off, must be something that can itself make a sound, because Aristoxenus proceeds to state that the highest note is sounded on the syrinx (συρίττοντος), in contrast to the lowest note, which is sounded on the aulos (αὐλοῦντος).[125] The syrinx is, of course, the small reed pipe, and a group of syrinxes tied together forms the Pan-pipe, which is also called—by extension—a syrinx. Since the syrinx is a little reed whistle, it is reasonable that an author such as Aristoxenus might refer to any reed whistle as a syrinx, whether it was tied together to form a Pan-pipe or inserted into the aulos as a mouthpiece. In fact, the reconstructions of the Elgin and Reading auloi demonstrate that the pitch of the mouthpiece alone—of whatever type—is higher than the pitch produced by the mouthpiece inserted into the resonator. Therefore, when the mouthpiece is compressed or the beating length of the glotta is shortened in order to produce "the highest note sounded on the syrinx," the range between this pitch and "the lowest note sounded on the aulos" is indeed considerably greater than the triple octave; it can easily be as great as four octaves.

---

[124] κατασπασθείσης γε τῆς σύριγγος ὁ τοῦ συρίττοντος ὀξύτατος πρὸς τὸν τοῦ αὐλοῦντος βαρύτατον μεῖζον ἂν ποιήσειε τοῦ ῥηθέντος διαστήματος (da Rios 27.1–3).

[125] It has been proposed by Howard ("The Αὐλός," 23–35) and others that the syrinx is some kind of speaker hole, but the mechanisms that appear on some auloi for opening and closing the trupemata are rotated, not drawn down or off. Moreover, the speaker hole, if there were one, could not itself make a sound in contrast to that of the aulos. Of course, except for the Reading aulos, none of the relatively complete surviving auloi possesses anything like a speaker hole (the hole observed by Howard in the Pompeiian aulos no. 76892 is too small to function as a speaker hole), and in the case of the Reading aulos, it is altogether uncertain that the small hole under the holmos is a speaker hole. A small hole is reported in fragment A (a holmos or hupholmion) of Athenian Agora (Landels, "Athenian Agora," 394), but it is impossible to know how this fragment might function in a complete instrument. The *Etymologicon magnum*, s.v. σῦριγξ (736.28–29), may at first seem to define the syrinx as "the hole of the musical aulos (τὴν ὀπὴν τῶν μουσικῶν αὐλῶν)," but this must be a misunderstanding of phrases like συρίγγων ἐνοπή or αὐλῶν συρίγγων τ' ἐνοπή, which appear in the Homeric hymn *In Mercurium* 512 and *Ilias* 10.13 and refer to the voice or the sound (ἐνοπή) of the syrinxes. An extended review of the evidence appears in Becker, *Entwicklungsgeschichte*, 68–80. See also Karl von Jan, "Der pythische Nomos und die Syrinx," *Philologus* 38 (1879): 378–84.

The Aristotelian *De audibilibus* clarifies the terminology in its description of different types of voices. The treatise first refers to the sound of a mouthpiece becoming higher and thinner when it is pressed by the lips; then, a second observation is added:

> If one presses on the mouthpiece, the sound becomes much higher and thinner. If one draws off the syrinxes and takes hold of them, there is a much greater volume of sound because of the quantity of breath, just as there is from thicker strings.[126]

Although this passage observes that the sound of a mouthpiece becomes higher when it is pressed, the larger topic of this section of the treatise is timbre, not height and depth of pitch, and the comparison of the second sentence has nothing to do with pitch. Thicker strings do not necessarily produce lower or higher pitches; that is a matter of their tension. They do, however, produce a louder and heavier tone. Likewise, when the mouthpiece is taken up and blown after being removed from the instrument, its sound is indeed loud and raucous because it lacks the definition provided by the resonator. The contrast, therefore, is between the thin sound of a mouthpiece (ζεύγη) pressed between the lips and played on the instrument and the reed itself (σῦριγξ) removed from the instrument and blown without any embouchure control.

Aristoxenus is quite adamant in the *Harmonica* that neither notation nor the simple knowledge of intervals nor musical instruments can be used to discover or understand the principles of harmonics. He is particularly critical of the aulos because of its tremendous flexibility of pitch,[127] which is obtained in part by various techniques employed by the aulete. Plutarch, in his polemic *Non posse suaviter vivi secundum Epicurum*, describes some of these techniques as part of a series of questions about the aulos:

---

[126] καὶ γὰρ ἂν πιέσῃ τις τὰ ζεύγη, μᾶλλον ὀξυτέρα ἡ φωνὴ γίγνεται καὶ λεπτοτέρα. κἂν κατασπάσῃ τις τὰς σύριγγας, κἂν δὲ ἐπιλάβῃ, παμπλείων ὁ ὄγκος γίγνεται τῆς φωνῆς διὰ τὸ πλῆθος τοῦ πνεύματος, καθάπερ καὶ ἀπὸ τῶν παχυτέρων χορδῶν (Bekker 804a12–17).

[127] Schlesinger, *Aulos*, 57–61, takes great pains to refute Aristoxenus's statements, but it is clear that he is perfectly correct.

> In the case of auloi of equal length, why does the narrower one sound higher and the wider one lower? Why, when the syrinx is drawn forth, does it make all the notes higher, but when it declines again, it makes them all lower? Why, when one aulos is brought next to the other, does it sound lower, but when separated, it sounds higher?[128]

The first question bears on Aelian's acoustic observation, noted earlier. Aelian, however, records the opposite phenomenon: the narrow pipe is lower. Plutarch must be thinking of the elumos aulos, in which the left-hand pipe, the wider and longer pipe with the bell on the end, must normally have produced the lower, louder pitch, while the shorter narrow pipe held in the right hand produced the higher pitch. Nevertheless, it must be reiterated that the actual pitch of the instrument is ultimately a matter of the fundamental of its reed, not the length of the resonator.[129]

Plutarch's second question is more difficult. It is reminiscent of the passages from Aristoxenus's *Harmonica* and the *De audibilibus* that referred to the sound of the syrinx played apart from the resonator, but Plutarch employs the slightly different verb *anaspan*. As the first and third questions seem to refer to the sound of the aulos as a whole, it is unlikely that the second question would refer to the separate sound of the syrinx. In view of the fact that the pitch of the single beating-reed mouthpiece can be raised and lowered by pressing at different points along the glotta, Plutarch is quite possibly referring to the appearance of the instrument as the aulete manipulates it. When the syrinx is drawn forth from the mouth by some distance, the beating length of the glotta is shortened, and the pitch of the instrument accordingly rises. When it declines—that is, when it disappears into the mouth—, the full beating length of the glotta comes into play, and the pitch of the instrument becomes lower.[130]

---

[128] οἷον διὰ τί τῶν ἴσων αὐλῶν ὁ στενότερος ὀξύτερον ὁ δὲ εὐρύτερος βαρύτερον φθέγγεται· καὶ διὰ τί τῆς σύριγγος ἀνασπωμένης πᾶσιν ὀξύνεται τοῖς φθόγγοις, κλινομένης δὲ πάλιν βαρύνεται, καὶ συναχθεὶς πρὸς τὸν ἕτερον βαρύτερον, διαχθεὶς δὲ ὀξύτερον ἠχεῖ (1096a–b [text from *Plutarch's Moralia,* 14:78]).

[129] On Aelian, see pp. 186–87; on the elumos aulos, see pp. 194–97 *supra.*

[130] It is perhaps somewhat odd that Plutarch did not use the terms ζεύγη and γλῶττα when referring to the mouthpiece in this particular context, that is, when he speaks of it functioning as a mouthpiece rather than as a separate reed pipe. On the other hand, these may have been the technical terms employed by specialists like Theophrastus and the author or compiler of the Aristotelian *De audibilibus,* while syrinx was the more common term employed by other writers.

Experiment on the reconstructions demonstrates the functionality of this process, especially with the single beating-reed mouthpiece. In the Elgin reconstruction, the entire pitch of the instrument can be raised a sixth, from a to f', by pulling the instrument away from the mouth, thereby shortening the glotta. At this pitch, each of the first four trupemata speaks clearly, but as would be expected, the intervals are now somewhat larger. They can, however, be corrected to equal the size of the intervals when the full length of the glotta is allowed to resonate. Once again, it should be stressed that the ability of a glotta to sound at different points along its length is affected by its voicing. Reeds can be produced that will speak effectively at the fifth and octave as well as the fundamental. In a limited range—and especially in the lower positions, when most of the glotta is allowed to vibrate—, the pitch of each trupema can easily be altered 100 cents in either direction, or in modern terms, each trupema can produce at least three chromatic pitches, just as Proclus observed. A single fingering could therefore be used to produce the small chromatic and enharmonic intervals that are so characteristic of ancient Greek music theory.[131]

In the Plutarchean *De musica*, Soterichus refers to a group of musicians including Tyrtaeus of Mantinea, Andreas of Corinth, Thrasyllus of Phlius, and others who eschewed the modern musical styles that involved modulation, the chromatic genus, and polychordia. He then adds to this group the aulete Telephanes of Megara, who "was so hostile to the syrinxes that he never allowed aulos makers to place them on his auloi." Telephanes also refused to participate in the Pythian games, apparently because of the innovation of the syrinx.[132] The syrinxes of this passage might be construed as mechanical devices that allowed the aulete to produce a larger number of pitches, but it is more reasonable to suppose that Telephanes objected to the use of the syrinx, or beating-reed mouthpiece, on his instruments. Although more facile, these mouthpieces are also much more difficult to play. Auletes using these mouthpieces could have produced more complex imitative compositions at the Pythian games, but they would have had to be highly skilled to perform with them. The double-reed mouthpiece, by contrast, is more stable, and it is therefore also more limited and accessible to the amateur musician. It may well have been the case that the double-reed mouthpiece was the type originally used on the auloi, while the single beating-reed mouthpiece was an innovation. In any event, Telephanes's objection is typical of the conflict between the old tradition of the citizen-musician and the new tradition of the professional.[133]

---

[131] On Proclus, see p. 209 *supra*. The three genera—diatonic, chromatic, and enharmonic—will be discussed in chapters 4–6.

[132] αὐτίκα Τηλεφάνης ὁ Μεγαρικὸς οὕτως ἐπολέμησε ταῖς σύριγξιν, ὥστε τοὺς αὐλοποιοὺς οὐδ' ἐπιθεῖναι πώποτ' εἴασεν ἐπὶ τοὺς αὐλοὺς, ἀλλὰ καὶ τοῦ Πυθικοῦ ἀγῶνος μάλιστα διὰ τοῦτ' ἀπέστη (1138a [Ziegler 17.2–5]).

Double pipes and the phorbeia

The iconographic and textual evidence indicates clearly that the aulos was normally played in pairs, but it is unclear whether the pipes played in unison or in some other manner. Paintings of auletes normally show them playing with identical fingering in the same position on each pipe, and Theophrastus's emphasis on the consonance of mouthpieces cut from the same reed section certainly suggests that the beating lengths of the reeds—whether single or double—would be the same. The reasonable assumption therefore follows that the pipes are playing in unison. Nevertheless, experiments with the reconstructions show that it is quite possible to cut the glottai of the mouthpieces in such a manner that they will play in octaves, fifths, or other intervals. Auletes may have played their instruments in parallel perfect intervals to enhance the overall resonance of the melody, they may have developed the practice of playing separate lines note-against-note, or they may have played separate lines with one pipe sustaining pitches against the other pipe's more active line. All these practices can be demonstrated on the reconstructions.[134]

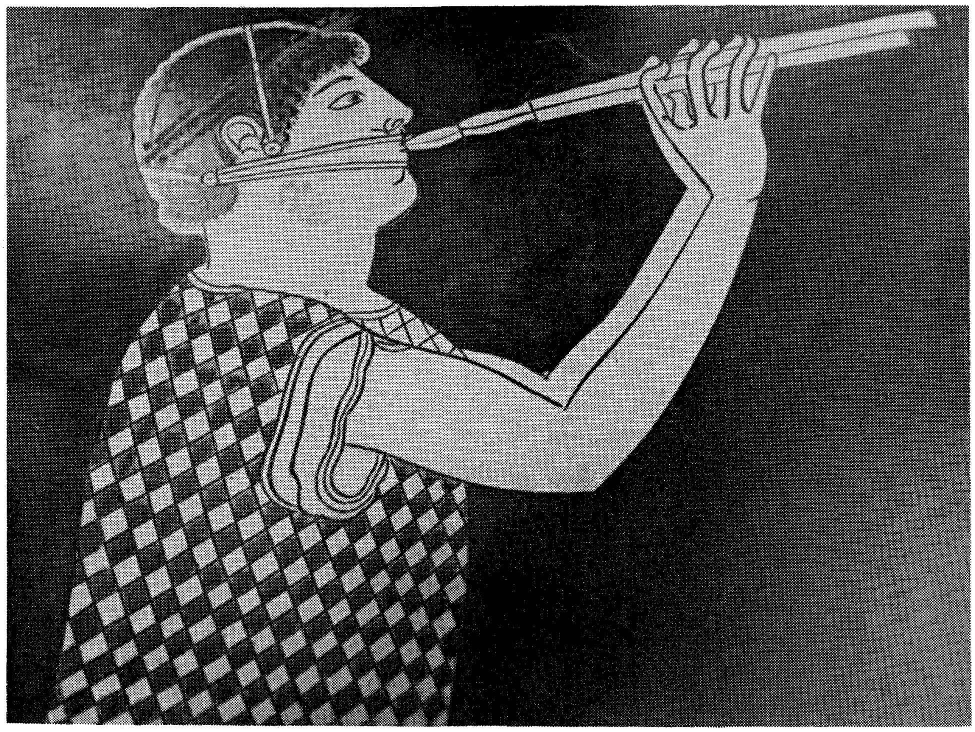
In order for the two pipes to sound simultaneously, the aulete must be able to provide a tight seal around both mouthpieces. While the muscles of the mouth can readily compress the lips around the bottoms, tops, and outer edges of the mouthpieces, it is more difficult to seal the space between the two mouthpieces in the center of the mouth. The embouchure can accomplish this task on a pair of double reeds more easily because they tend to be rather flat. The single beating-reed mouthpiece, by contrast, retains the round shape of the original reed and may be 8 mm or more in diameter; experiment proves that it is quite difficult to maintain a sealed embouchure around two 8-mm reeds for any length of time. In neither case does this sort of embouchure permit much, if any, independent control of the two reeds. Moreover, the muscular tension required to seal the embouchure around two reeds also tightens the cheeks and pulls them against the teeth. This type of facial stress is at variance with the illustrations of auletes, whose cheeks tend to be puffed.

---

[133] On the changing traditions, see chapter 2, pp. 44, 58, 75, 80, 92–93, and 106.

[134] Karl von Jan, "Die Griechen bliesen nicht auf einfachen, sondern auf doppelten Auloi," in *Verhandlungen der 34. Versammlung deutscher Philologen und Schulmänner Trier 1879* (Leipzig: B. G. Teubner, 1880), 157–61. Bélis, "Auloi grecs du Louvre," 115–16, hypothesizes that the pipes did not sound simultaneously; rather, the two pipes functioned as a "double aulos," providing a greater number of possible notes—including notes too close together to be bored on a single pipe. She does not explain, however, how the aulete could switch rapidly back and forth from pipe to pipe.

Most of these difficulties could be reduced by the phorbeia (φορβειά), a kind of mouth-band shown in many illustrations of auletes. The Kleophrades Painter provides a particularly detailed view of a phorbeia in his painting on a red-figure amphora in the British Museum (figure 30).[135]



©Copyright the British Museum

Figure 30.

---

[135] Ca. 480 B.C.E. London, British Museum E 270.

The phorbeia is mentioned in Plutarch's *De cohibenda ira* and described by scholiasts and some of the lexicographers, but their comments tend to be brief, and the actual function of the phorbeia remains unclear from the literary and iconographic sources.[136] Plutarch, for example, observes that Marsyas employed special devices—a phorbeia and peristomios—when he played the aulos. After telling the story of Athena discarding the aulos because it distorted her features, he explains these terms by quoting two lines now commonly attributed to Simonides:

> Marsyas, it seems, suppressed the violence of his breath with a phorbeia and peristomios, composed his countenance, and concealed the distortion:
>
> > He fitted his forehead locks with gleaming gold and his blustering
> > mouth with leather straps bound behind.[137]

In fact, the term *phorbeia* also refers to a horse's halter, which bears a remarkable resemblance to the device pictured in figure 30. A peristomios is something that goes around a mouth. Plutarch is probably using the terms as synonyms, and the two of them together convey a reasonably clear sense of the appearance of the phorbeia. Its precise construction and function, however, remain unclear in this description.

The phorbeia is rarely shown without the aulos—or some other instrument—in the aulete's mouth, but one kylix in the Metropolitan Museum of Art in New York City does show the aulete adjusting the phorbeia while holding both auloi in his left hand at his waist. This illustration clearly indicates that the phorbeia has a slit or hole for each mouthpiece.[138] As the aulete prepares to play, the mouthpieces must then be inserted through the holes into the mouth.

---

[136] Annie Bélis, "La phorbéia," *Bulletin de correspondance hellénique* 110 (1986): 205–18, provides a useful summary of the evidence. See also Becker, *Entwicklungsgeschichte*, 120–29.

[137] καὶ ὁ Μαρσύας, ὡς ἔοικε, φορβειᾷ τινι καὶ περιστομίοις τοῦ πνεύματος τὸ ῥαγδαῖον ἐγκαθεῖρξε καὶ τοῦ προσώπου κατεκόσμησε καὶ ἀπέκρυψε τὴν ἀνωμαλίαν, χρυσῷ δ' αἰγλήεντι συνήρμοσεν ἀμφιδασείας | κόρσας, καὶ στόμα λάβρον ὀπισθοδέτοισιν ἱμᾶσιν (456b–c [text from *Plutarch's Moralia*, 6:112]).

[138] New York, Metropolitan Museum of Art, kylix no. 96.9.18. The presence of two separate holes is confirmed by a volute krater (no. IG 8263) in the Museo Nazionale in Tarento (reported in Bélis, "Phorbéia," 206).

Hesychius, in his *Lexicon,* defines the phorbeia as a skin placed around the mouth of the aulete to prevent his lip from parting.[139] Experiment with the reconstructions demonstrates the aptness of this definition. Plutarch's reference to Marsyas's "blustering mouth" clearly evokes the hissing and spitting sounds that tend to emerge from any poorly sealed embouchure, especially as the pressure of the performer's breath increases. With two mouthpieces, the difficulty of maintaining a tight seal is much greater. Wearing the phorbeia, however, allows the performer to maintain a relaxed embouchure because the phorbeia itself seals the mouth and holds the lips together against the pressure of the breath. A relaxed embouchure in turn avoids the tendency of a tight embouchure to choke the reed—or stop it from beating altogether—and allows the lips to exercise sensitive adjustments in pressure on the reed. In addition, with the phorbeia, the mouthpiece itself can be easily withdrawn by increments from the mouth in order to shorten the length of the glotta. Without the phorbeia, it is much more difficult to maintain a tight seal around the mouthpieces while moving them in and out of the mouth to adjust pitch and timbre. Contrary to the common conjecture,[140] the phorbeia does not provide special support for cheeks, enabling them to act like a bellows, except in the sense that it allows the facial muscles to relax because they are not needed to maintain a sealed embouchure.

There is no easy explanation for the fact that aulos players are often shown without the phorbeia. Experiment does indicate, however, that short and simple phrases can be played on the auloi without greatly fatiguing the embouchure. Thus, it may be conjectured that the phorbeia was introduced to allow auletes to play the longer, more difficult compositions characteristic of the innovative style of the auletic competitions.

The aulos, with its unique sound and flexibility of pitch, was fully capable of playing the subtly inflected scales described in the treatises. Beyond this, it is nearly impossible to generalize about the instrument, especially over several centuries' development. It could be played with single or double reeds, in pairs or as a single pipe, in low or high registers, outdoors—in settings such as the theatre or processions—or indoors at symposia or private occasions, by men or women, with or without the phorbeia, and so on. Although viewed by some as a foreign instrument that introduced unwonted complexity and virtuosity into their most venerable musical traditions,[141] by the fifth century B.C.E., the aulos had become one of the two or three most important musical instruments in Greek culture. Only the lyre and the kithara could challenge its role in education, the theatre, the festivals, and the music of daily life.

---

[139] Hesychius, s.v. φορβειά: τὸ περικείμενον τῷ στόματι τοῦ αὐλητοῦ δέρμα, ἵνα μὴ σχισθῇ τὸ χεῖλος αὐτοῦ.

[140] Sachs, *History of Musical Instruments,* 138; Barker, *Greek Musical Writings,* 1:273 n. 57.

Syrinx

While the aulos assumes a central place in the Greeks' high culture, the syrinx remains a simple pastoral instrument. The "Shield of Achilles" in the *Iliad* 18.526 portrays shepherds delighting themselves with the syrinx, and although Plato, in Book III, chapter 10 of his *Respublica,* excludes all the complex musical instruments from his city, leaving only the lyre and the kithara as useful, he allows that "in the fields, the shepherds would have the syrinx."[142]

The term *syrinx*, as already noted, refers simply to a little whistle made of reed, and it can be applied to a single pipe, a group of reeds of graduated length bound together—the Panpipe—or an aulos mouthpiece, which is made from the same type of reed, though cut and prepared in a different manner. The syrinx in one form or another is an instrument of considerable antiquity,[143] and like the aulos, it tended to be viewed by the Greeks as a "foreign" instrument, if not as the invention of one of the gods. The Homeric hymn *In Mercurium* (511–12), for instance, attributes the general invention of the syrinx to Hermes, while Athenaeus's *Deipnosophistae* 4.82 suggests a somewhat more complex development:

---

[141] It—like other musical instruments—might also be viewed as a sexual symbol. For suggestions about the sexual symbolism of musical instruments, see Apostolos N. Athanassakis, "Music and Ritual in Primitive Eleusis," *Platon* 28 (1976): 86–105.

[142] καὶ αὖ κατ' ἀγροὺς τοῖς νομεῦσι σύριγξ ἄν τις εἴη (399d). The earlier part of this passage is quoted on p. 160 *supra*. Cf. Athenaeus *Deipnosophistae* 4.75 (174e [Kaibel 1:392]). For a collection of passages from fifth-century tragedy referring to the syrinx, see Barker, *Greek Musical Writings*, 1:90–92.

[143] See Marius Schneider, "Primitive Music," in *Ancient and Oriental Music*, ed. Egon Wellesz, New Oxford History of Music, vol. 1 (London: Oxford University Press, 1957), 37; Laurence Picken, "The Music of Far Eastern Asia," in ibid., 90, 92, and 184; and Farmer, "Music of Ancient Egypt," 268–69.

> Metrodorus of Chios, in *The Trojans,* says that the syrinx and the aulos were discovered by Marsyas in Celaenae, where they formerly played the syrinx with one reed. Euphorion, the epic poet, says in his treatise on melic poets that Hermes discovered the monokalamos [i.e., single-reed] syrinx—but others tell that it was Seuthes and Rhonaces of the Maedoi—, that Silenus discovered the polykalamos [i.e., many-reed] syrinx, and that Marsyas discovered the kerodetos [i.e., wax-bound] syrinx.[144]

On the other hand, Diodorus Siculus's *Bibliotheca* 3.58 attributes the invention of the polykalamos syrinx (πολυκάλαμος σῦριγξ) to Cybele, while Pollux's *Onomasticon* 4.77 associates it with the Celts and "islanders in the ocean."[145]

Pan, the son of Hermes, is the figure most commonly connected with the instrument, especially by later writers such as Ovid.[146] The Byzantine *Hagiopolites,* too, mentions Pan, but here his association with the syrinx is used only as a means of introducing a more detailed history of the instrument's discovery.

> There are two species of the syrinx: one is the monokalamos; the other, the polykalamos, which they say was the discovery of Pan, son of Aither and the nymph Oenoe. But this is a myth. The following is the natural explanation. At the time of the Pierian Olympus, when a reed-bed had dried up, a reed was broken with an edge like a syrinx, and when the wind streamed across the edge, the reed gave forth a clear sound. Hearing this sound, the shepherd was pleased, and when he had cut off the reed, he played on the syrinx a soft and alluring sound. After he had made other instruments in the same manner, he arranged them in proportion to the already discovered note. And when he made a five-reed syrinx, he was admired by the other shepherds. Later, its use was honored by the shepherds and other rustics, and finally, it was adopted in civic amusements. The kings of Macedonia then brought the use of syrinxes into their kingdom, and there came to be the so-called Macedonian melos. After this, Attis made a ten-reed aulos and called it the shepherd's syrinx. He made the first reed ten *daktuloi* in

---

[144] Μητρόδωρος δ' ὁ Χῖος ἐν Τρωικοῖς σύριγγα μέν φησιν εὑρεῖν Μαρσύαν καὶ αὐλὸν ἐν Κελαιναῖς, τῶν πρότερον ἑνὶ καλάμῳ συριζόντων. Εὐφορίων δ' ὁ ἐποποιὸς ἐν τῷ περὶ μελοποιῶν τὴν μὲν μονοκάλαμον σύριγγα Ἑρμῆν εὑρεῖν, τινὰς δ' ἱστορεῖν Σεύθην καὶ Ῥωνάκην τοὺς Μαιδούς, τὴν δὲ πολυκάλαμον Σιληνόν, Μαρσύαν δὲ τὴν κηρόδετον (184a [Kaibel 1:401]). The Maedoi are a Thracian tribe; Celaenae is a city in Phrygia. Thrace, Chios, and Phrygia appear on map 1, p. 20.

[145] ἡ δὲ ἐκ καλάμων σῦριγξ Κελτοῖς προσήκει καὶ τοῖς ἐν Ὠκεανῷ νησιώταις (Bekker 160).

[146] *Metamorphoses* 1.689ff. But see also the Homeric hymn *In Pana,* and Euripides *Ion* 492–502, *Electra* 699–705, and *Iphigenia Taurica* 1123–25.

> length and lessened each by a *daktulos* until the fourth; the rest had edges of a length equal to six *daktuloi*. He preserved this cut through the difference of their breadths. Then, he played pastoral and goatherd mele on the banks of the Sangarios river.[147]

The dimensions of Attis's syrinx depend on the measure of the *daktulos*, which could vary somewhat but was ca. 2 cm. Thus, the length of the longest pipe was ca. 20 cm. The ninth pipe would then be 18 cm; the eighth, 16 cm; the seventh, 14 cm; and the sixth through tenth pipes, 12 cm. As flues, the pipes of the syrinx produce pitches that correspond directly to their length; the pitch is not contingent on characteristics of a single or double reed mouthpiece. The dimensions of this syrinx would produce the interval of a whole tone (9:8) between the ninth and eighth pipes, a slightly smaller interval between the tenth and ninth pipes, and progressively larger intervals between the eighth, seventh, and sixth pipes. This pattern depends on the pipes being open, but the description would seem to support such an assumption. It observes, quite correctly, that the smaller reeds must also be narrower in width to produce the higher pitches. The relationship between length and breadth is less crucial for stopped pipes. The remaining five pipes must have been shortened by boring a hole at the desired position.

By comparison, the Roumanian *nai*, which is certainly a descendent of the polykalamos syrinx, can include twenty or more pipes, usually ranging from 4 to 20 cm. An instrument in these dimensions produces twenty small semitones in a ratio of 18:17 with room to spare, and it is small enough for the hands to manage. The Roumanian *nai* employs a graduated array of pipes from top to bottom, unlike Attis's syrinx, which is graduated only in the lower half. The fully graduated syrinx, however, was known to Pollux, who uses the image of a bird's wing in describing the instrument as an ensemble of reeds ranging from longer to shorter.[148]

---

[147] Σύριγγος εἴδη δύο· τὸ μὲν γάρ ἐστι μονοκάλαμον, τὸ δὲ πολυκάλαμον· ὅ φασιν εὕρημα Πανὸς τοῦ Αἰθέρος καὶ νύμφης Οἰνοης. καὶ ὁ μὲν μῦθος οὕτως, ὁ δὲ φυσικὸς λόγος τοιοῦτος· Κατὰ τὸν Πιερικὸν Ὄλυμπον καλαμῶνος ἀποξηρανθέντος ἀποθραυσθεὶς δόναξ εἰς συριγκοειδῆ χείλωσιν ὑπὸ τοῦ εἰσρέοντος ἀνέμου διὰ τῆς χειλώσεως λιγυρὸν ἦχον ἀπετέλει. οὗπερ ὁ ποιμὴν ἀκούσας ἥσθη, καὶ τοῦτον ἐκτεμὼν προσηνές τι καὶ ἐπακτικὸν ἀπεσύριζεν. ὁμοίῳ δὲ τρόπῳ καὶ ἄλλους ὀργανοποιησάμενος τοὺς ἀναλογίαν ἔχοντας πρὸς τὸν εὑρημένον φθόγγον ἡρμόσατο· καὶ ποιήσας πεντασύριγγον ἐζηλώθη παρὰ τῶν ἄλλων ποιμένων. εἶτα τούτοις ἔντιμος ἡ χρῆσις γινομένη καὶ τοῖς λοιποῖς ἀγροίκοις, ὕστερον καὶ ἐν ταῖς πολιτικαῖς ἀπολαύσεσι παρελαμβάνετο. οἱ δὲ τότε Μακεδόνων βασιλεῖς ἐπὶ τὰ βασίλεια μετήνεγκον αὐτῶν τὴν χρῆσιν, ὥστε μέλος ἐπικαλεῖσθαι Μακεδονικόν. Μετὰ δὲ τοῦτο Ἄττις τὸ δεκακάλαμον αὐλοποιήσας ποιμενικὴν ἐκάλει σύριγγα, ποιήσας τὸ⟨ν⟩ μὲν πρῶτον δεκαδάκτυλον· καὶ δακτύλῳ ἀφελὼν ἕως τεσσάρων, τοὺς λοιποὺς ἰσομήκεις ἑξαδακτύλῳ χειλώσας, †τηρήσας τῇ τῶν παχῶν διαφορᾷ τὴν τομήν,† τὰ βουκολικὰ καὶ αἰπολικὰ παρὰ τὸν Σαγγάριον ποταμὸν ἐσύρισε (text from *The Hagiopolites: A Byzantine Treatise on Musical Theory*, ed. Jørgen Raasted, Cahiers de l'Institut du moyen-âge grec et latin, vol. 45 [Copenhagen: Université de Copenhague, 1983], 83–84). The date of the *Hagiopolites* is not known; the earliest manuscript containing the treatise is Parisinus gr. 360, which dates from the fourteenth century.

The syrinx could be tuned in a number of ways. The pipes could be cut to the proper length, which would produce an instrument in the form described by Pollux. Individual pipes could also be tuned by boring a single hole in each to define their speaking lengths. In addition, the Aristotelian *Problemata* (19.23 [919b8–11]) remark in passing that the syrinx was tuned by plugging wax into the various pipes in order to produce sounding lengths in the proper ratio. This procedure is possible, but stopping the pipes doubles their sounding length and causes them to speak an octave lower, as well as modifying their timbre. It is therefore quite unlikely that stopped pipes were mixed with open pipes in a single syrinx. In any case, this section of the *Problemata* is more a theory of acoustics than a description of the actual functioning of musical instruments, and comment on the tuning of the syrinx appears in a section primarily devoted to describing some of the mathematical principles of harmonics. The author remarks on the placement of trupemata on the auloi, but as already noted, his suppositions about the intervals produced by the trupemata are incorrect. While the author's description of the intervals produced by the various stopped pipes of his syrinx is correct, it is difficult to regard him as a reliable observer of wind instruments. References to them were perhaps included merely in an attempt to present all the instruments as visually embodying the same harmonic principles.[149]

Hydraulis

As a collection of pipes, each of which produced only a single fixed pitch, the polykalamos syrinx lent itself to mechanization, and indeed, the hydraulis (ὕδραυλις) was described by Philo

---

[148] Pollux *Onomasticon* 4.69.

[149] See p. 210 *supra*.

Byzantius as "a syrinx played by the hands."[150] The instrument is briefly noted in Athenaeus's *Deipnosophistae* (4.75 [174a–e]) as the invention of Ctesibius, a mechanic and perhaps a barber who lived in Alexandria,[151] and its sound is characterized as "sweet and delightful" (ἡδὺς καὶ τερπνός). These descriptions suggest that the hydraulis was originally an instrument of flue pipes blown with a relatively light wind pressure, rather than the large instrument of metal pipes (and perhaps reeds) blown with a high wind pressure that later became common in outdoor arenas. Though Philo is principally interested in the piston pump invented by Ctesibius rather than in the hydraulis itself, his description does make it clear that the wind for the instrument was supplied by this pump and that a constant wind pressure was maintained by the force of water displaced from a central chamber. Thus, it is much more likely that the term *hydraulis* is derived from ὕδωρ (water) and αὐλή (chamber), rather than the more commonly assumed compound of ὕδωρ and αὐλός.

Athenaeus states that Aristoxenus did not know the hydraulis, but full descriptions of the instrument are provided between the first century B.C.E. and the first century C.E. by Hero of Alexandria and Vitruvius.[152] As early as 90 B.C.E., a Delphic inscription refers in glowing terms to the hydraulist Antipatros, who won the musical competition in that year,[153] and the instrument is also mentioned in passing by Nicomachus of Gerasa in his *Manuale harmonices* and Porphyrius in his commentary on Ptolemy's

---

[150] *Mechanicae syntaxis* 4.77: ἐπὶ τῆς σύριγγος τῆς κρουομένης ταῖς χερσίν (Richard Schöne, ed., *Philonis Mechanicae syntaxis libri quartus et quintus* [Berlin: Reimer, 1893]). Philo flourished in third and early second centuries B.C.E. For an extended treatment of Alexandrian automata, see Reinhold Hammerstein, *Macht und Klang: Tönende Automaten als Realität und Fiktion in der alten und mittelalterlichen Welt* (Bern: Francke, 1986).

[151] His floruit is uncertain, but it was probably in the third century B.C.E.

[152] Athenaeus's reference to Aristoxenus (Ἀριστόξενος μὲν οὖν τοῦτο οὐκ οἶδε [174c (Kaibel 1:391)]) is a bit vague and can be interpreted in various ways. Jean Perrot (*The Organ from Its Invention in the Hellenistic Period to the End of the Thirteenth Century*, trans. Norma Deane [London: Oxford University Press, 1971], 6) takes it to mean that Aristoxenus did not know of the hydraulis because it had not yet been invented. Cf. Barker, *Greek Musical Writings*, 1:260–61. Hero probably flourished in the first century C.E., Vitruvius in the first century B.C.E.

[153] Inscr. 737 (W. Dittenberger, *Sylloge inscriptionum graecarum*, 3d ed., 4 vols. [Leipzig: Hirzel, 1915–24; reprint, Hildesheim: Olms, 1982], 2:412–13).

Harmonica.[154] Its mechanism (see figure 31) was sufficiently complex to insure that it could never have become a common instrument, but at least by the first century B.C.E., it had become a recognized part of the musical culture.[155]

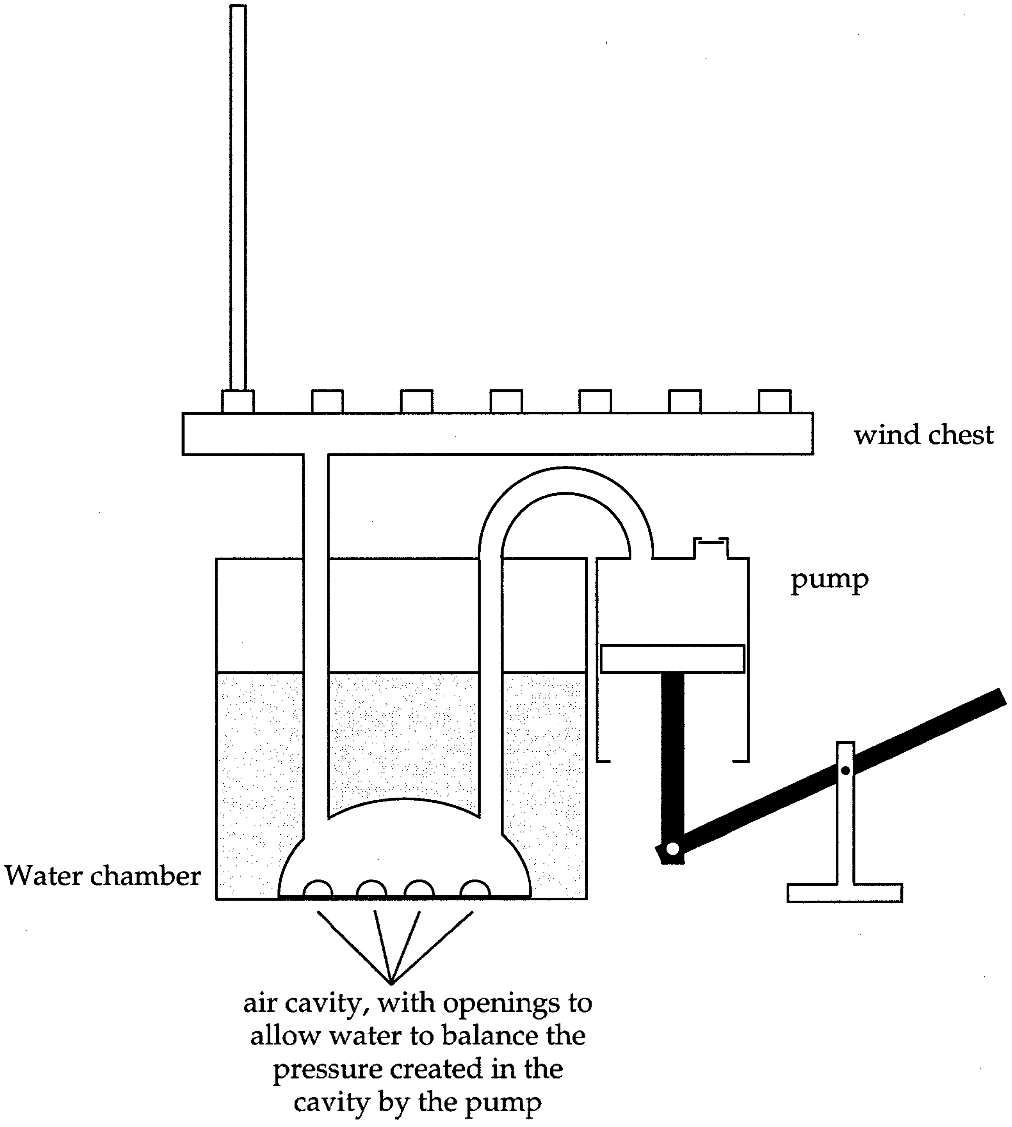

wind chest
pump
Water chamber
air cavity, with openings to allow water to balance the pressure created in the cavity by the pump

Figure 31.

---

[154] Nicomachus *Manuale harmonices* 4 (Jan 243.11); Porphyrius *In Ptol. Harm.* 1.8 (Düring 119.28). Nicomachus flourished in the second century C.E., Porphyrius in the third.

[155] The instrument is also mentioned in Cicero *Tusculanae disputationes* 3.18; *Aetna* 292–97; and many later Latin sources. See Perrot, *Organ*, 48–70, for a summary extending to the sixth century C.E.

Hero discusses the hydraulis in chapter 42 of his *Pneumatica.* The pump mechanism and the role played by the water are nearly identical to the instrument described by Philo,[156] but Hero adds considerable information about the arrangement of the pipes on the wind chest. Hero's instrument already exhibits the familiar mechanical action of the organ. Each pipe was aligned with a hole in the top of the wind chest, and air was allowed into the pipe by pressing a lever to move a perforated slider back and forth so that its hole either corresponded or did not correspond to the hole in the wind chest (figure 32).

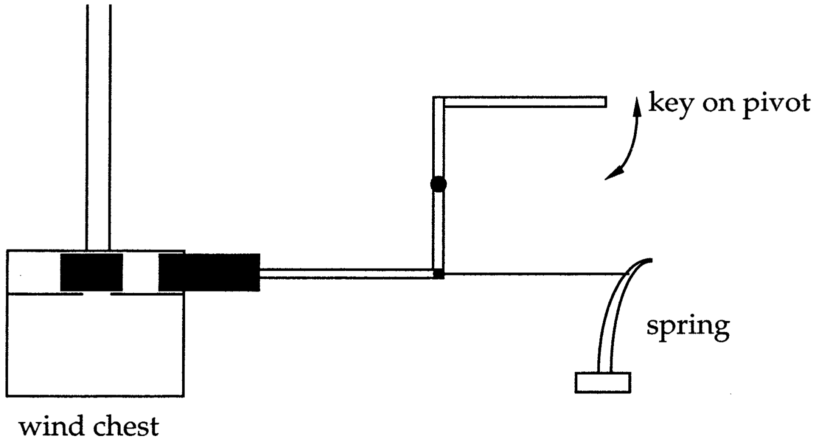


Figure 32.

Hero refers to the pipes themselves as auloi, and this may suggest that the hydraulis had reed rather than flue pipes.[157] The term *aulos,* however, can simply refer to the bombyx, or the resonating pipe itself, entirely apart from the reed mouthpiece.[158] Moreover, descriptions of the sound of the hydraulis, at least in its earlier development, do not fit the loud and resonant sound characteristic of the aulos. There are, in addition, considerable difficulties in developing a resonating reed pipe that can be blown by a wind chest. The aulos mouthpiece relies on the articulation of the aulete's lips and tongue, and like all reeds taken into the mouth, it requires some moistening before it begins to play. Reed pipes on an organ, by contrast, are much more like the capped reeds of later instruments such as the krummhorn. There is no evidence to suggest that this type of capped resonating reed pipe was developed for the hydraulis in the first few centuries of its existence. In fact, all the pipes of the earliest surviving organ, the famous organ of Aquincum (third century C.E.), are flues.[159]

---

[156] Figures 31–32 are based on Hero's description and the drawing in Perrot, *Organ,* 29 and 32.

[157] Perrot, *Organ,* 33.

[158] See p. 184 *supra.*

Vitruvius's description of the hydraulis, in *De architectura* 10.83, applies to a larger instrument, but the principles are the same. There are now two pistons, which pump in alternation, and the instrument may have four, six, or eight ranks. The ranks can be opened or closed individually, and when open, air passes into the channel over which the pipes of that rank are arranged. The key action, like Hero's, is above rather than below these channels and is based on a perforated slider, but there are now as many perforations in the slider as there are ranks. If air has been allowed into the channel for a given rank, the pipe will sound when the key is depressed.

Pollux's *Onomasticon* 4.70 also refers to the "watery aulos" (ὑδρηλὸς αὐλός), which he describes as like an inverted syrinx of bronze pipes blown from below. The smaller of these instruments, Pollux asserts, is blown by a bellows, while in the larger ones, the current of air is forced upwards by the water. The instrument has many voices, and the bronze of its pipes gives it a bolder sound.[160] The metal in the pipes of the Aquincum organ tends to confirm this description: it is a bronze alloy of .08% tin, .08% lead, 17.83% zinc, and 81.80% copper.

The tuning of the pipes of the hydraulis is not specified in any source, and the archaeological remains do not allow for a positive identification of their pitch. The Aquincum organ had fifty-two pipes, arranged in four ranks of thirteen pipes each. The ratio between the shortest and longest pipes is close to 2:1. Most iconographic representations show eight pipes, but instruments with seven, nine, ten, and fifteen pipes are also portrayed. In these representations, the ratio between the shortest and longest pipes ranges from 3:1 to 4:3. It seems reasonable to suppose that the pipes were tuned in some combination of whole tones and semitones, but it is not possible to be certain.[161]

---

[159] Perrot, *Organ*, 113. On this instrument in general, see Werner Walcker-Mayer, *Die römische Orgel von Aquincum* (Ludwigsburg: Musikwissenschaftlicher Verlag, 1970); and Melinda Kaba, *Die römische Orgel von Aquincum (3. Jahrhundert)*, Musicologica hungarica, Veröffentlichungen des Musikwissenschaftliches Institut in Budapest, vol. 6 (Budapest: Akadémiai, 1976). The pipes of the fragments from Pompeii are also flues, although these may actually be musical automata rather than organs. Neither the Aquincum instrument nor the Pompeiian fragments are hydrauleis; like the modern organ, they were blown by bellows.

[160] τούτῳ δὲ κατὰ τὸ ἔμπαλιν ἔχων ὁ ὑδρηλὸς αὐλός, ἀντεστραμμένῃ σύριγγι παρεοικώς, χαλκοῦς μέν ἐστιν ὁ κάλαμος, κάτωθεν δὲ ὑποπνεόμενος, φύσαις μὲν ὁ ἐλάττων, ὕδατι δὲ ὁ μείζων ἀναθλιβομένῳ καὶ αὔραν πνεύματος ἀφιέντι. πολύφωνός τις οὗτος αὐλός ἐστιν, καὶ ὁ χαλκὸς ἔχει τὸ φθέγμα ἰταμώτερον (Bekker 159).

Salpinx and Horn

The Greeks and the Romans, like other ancient and modern cultures, recognized the value of music and musical instruments in preparing forces for battle, scaring or impressing their opponents, and coordinating the movement of troops. Idiophones and membranophones in particular, it will be recalled, were used by the Parthians to create a frightening din, and even in relatively modern warfare, ensembles of percussion and blaring instruments such as the Turkish Janissary bands were still used to motivate one side and terrify the other. The salpinx (σάλπιγξ) and the horn (κέρας), which could produce specific pitches heard over the chaos of battle, were of special value, not only because their sound carried better than the sound of a voice but also because the meaning of their signals might be clear to one side and incomprehensible to the other. Aristides Quintilianus remarks on this use of the salpinx in the second book of his *De musica*:

> She [Rome] often rejects verbal orders as damaging if they should be discerned by those of the enemy speaking the same language and makes codes through music by playing the salpinx—a warlike and terrifying instrument—and appointing a specific melos for each command. When the attack was by line and the approach was by column, she set down special mele, and a different kind for retreat; and when the pivoting was to the left or right, again there were specific mele for each; and so she accomplishes every maneuver one after another by means of codes that are on the one hand unclear to the enemy and on the other hand are both totally clear and easily recognized by the allies. For they do not hear these codes only in part, rather the whole corps follows a single sound.[162]

---

[161] For a fully developed hypothesis on the tuning of the hydraulis, see Perrot, *Organ*, chapter 7.

[162] τὰ μὲν διὰ λόγων πολλάκις ἀποδοκιμάζει παραγγέλματα ὡς βλάψοντα, εἰ τοῖς ὁμοφώνοις τῶν πολεμίων διαγνωσθείη, διὰ μουσικῆς δὲ ποιεῖται τὰ σύμβολα, ὄργανον μὲν ἀρήιόν τε καὶ καταπληκτικὸν μεταχειριζομένη τὴν σάλπιγγα, ἑκάστῳ δὲ παρεγγυήματι μέλος ἴδιον ἀφορίζουσα· ἐπιδρομῆς οὖν τῆς κατὰ μέτωπον καὶ ἐφόδου τῆς κατὰ κέρας ἰδιάζοντα κατατέτακται μέλη, καὶ ἀνακλητικὸν

Although Aristides Quintilianus is speaking of the Romans, the salpinx was also used by the Greeks. Aeschylus, Sophocles, and Euripides all mention it on a number of occasions in various roles, and the Plutarchean Soterichus, the second speaker in the *De musica*, confirms the military use of the salpinx, adding that the Spartans went to war to the accompaniment of the "Castorian melos" played on the auloi, while the Cretans preferred the lyre.[163]

Athenaeus's *Deipnosophistae* asserts that it was the Etruscans who discovered the horn and the salpinx, but he says nothing about their construction. By contrast, Pollux devotes considerable attention to the salpinx in his *Onomasticon*. He agrees with Athenaeus in associating it with the Etruscans, and he describes it as either straight or curved in form. The instrument is made of bronze and iron, with a bone mouthpiece. Its sound is described as booming, roaring, loud, clear, stout, powerful, deep, solemn, violent, frightening, terrifying, war-like and hostile, forceful, stark, weighty, rough, and troubling. Pollux also comments on the various signals played by the salpinx in its military role—such as encouragement, advance, and retreat—as well as its use for fanfares and other signals in various contexts.[164]

Pollux employs the term γλῶττα in referring to the bone mouthpiece, the same term he used to refer to the mouthpiece of the aulos. Theophrastus, on the other hand, used the term to refer to the actual beating reed in the mouthpiece of the aulos. As there is no reason to assume that the salpinx was sounded by any reeds

---

ἕτερον, ἐξελίξεών τε τῶν ἐπ' ἀσπίδα ἢ ἐπὶ δόρυ πάλιν ἑκάστης ἴδια, καὶ πάντα οὕτως ἐφεξῆς περαίνει τὰ σοφίσματα συμβόλοις τοῖς μὲν πολεμίοις ἀδήλοις, τοῖς δὲ φιλίοις σαφεστάτοις τε καὶ δι' εὐχερείας γινωσκομένοις· οὐ γὰρ κατὰ μέρος τούτων διακούουσιν, αλλ' ἠχῇ μιᾷ τὸ σύμπαν ἕπεται σύνταγμα (W.-I. 62.7–19). Mathiesen, *AQ on Music*, 125–26.

[163] Aeschylus *Eumenides* 566–69, *Persae* 394–95, *Septem contra Thebas* 393–94; Sophocles *Electra* 711; Euripides *Phoenissae* 1377–79, *Rhesus* 988–89; Plutarch *De musica* 1140c (Ziegler 22.11–17). On the authority of Polybius, Athenaeus *Deipnosophistae* 14.22 (626a–b [Kaibel 3:381]) confirms the Spartans' and Cretans' preference for other instruments in place of the salpinx. Some of the types of military music were discussed in chapter 2 (see pp. 153–55).

[164] *Onomasticon* 4.85–86: τὸ δὲ σχῆμα εὐθεῖά τε καὶ καμπύλη, ἡ δὲ ὕλη χαλκὸς καὶ σίδηρος, ἡ δὲ γλῶττα ὀστίνη. εἴποις δ' ἂν τὸ φθέγμα τῆς σάλπιγγος καὶ φωνὴν καὶ ἦχον καὶ βόμβον καὶ θόρυβον καὶ κτύπον, ὄρθιον, ἐρρωμένον, ῥωμαλέον, βαρύ, σεμνόν, σφοδρόν, φρικῶδες, ἐκπληκτικόν, πολεμιστήριον καὶ ἐμπολέμιον, βίαιον, στερεόν, ἐμβριθές, τραχύ, ταραχῶδες (Bekker 162). See also *Onomasticon* 4.87–90.

other than the player's own lips, it would seem Pollux uses the term to refer to mouthpieces in general.

Salpinxes are shown quite frequently in vase paintings, and a number of nearly complete instruments survive. The Museum of Fine Arts in Boston preserves an instrument 157 cm in length made in thirteen sections of ivory joined with bronze rings. The bell is also of bronze and in the shape of a funnel.[165] The small flair at the other end of the pipe may be the mouthpiece, or it may have been intended to receive a detachable mouthpiece. In any case, the material of this particular salpinx suggests that it was probably a ceremonial instrument of some sort, not one intended for use in battle. If there was a detachable mouthpiece, as Pollux's description suggests, its shape and the length of its back bore would have been quite important to the overall sound of the instrument. The combination of the player's lips, cup, and back bore in a mouthpiece create a Helmholtz resonator,[166] which effectively lengthens the tube into which it is inserted. Thus, although the general harmonics of a surviving salpinx can be determined, the mouthpiece would have altered them to some degree.

Like the later straight trumpet, the salpinx would be capable of playing the fundamental pitch of its pipe and a series of harmonics, depending on the mouthpiece and the skill of the performer. As the salpinx was used principally for signals and fanfares, the lower harmonics must have been the more important pitches of the instrument. In fact, the solmization syllables on the fifth-century black-figure epinetron described in chapter 2 produce a line that would need to extend no further than the fifth harmonic.[167]

Players of the salpinx often wore the phorbeia, which must have served the same purpose as it did for the aulos. In the illustration of Epiktetos (ca. 520–490 B.C.E.) for an eye kylix, a satyr wears the phorbeia while sounding the salpinx over his shoulder (figure 33).[168]

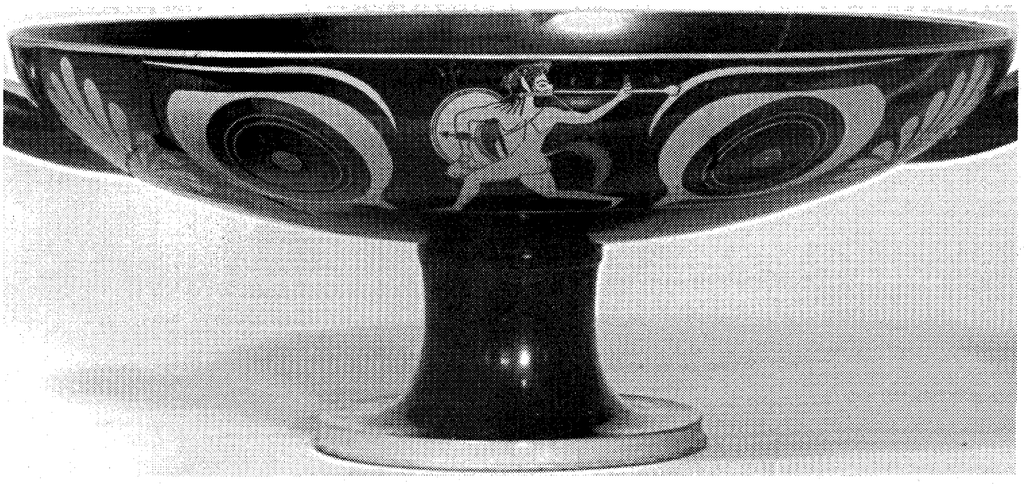
---

[165] Sachs, *History of Musical Instruments,* 145, based on L. D. Caskey, "Archaeological Notes," *American Journal of Archaeology* 41 (1937): 525–27.

[166] For a simple description of the Helmholtz resonator, see John Backus, *The Acoustical Foundations of Music* (New York: W. W. Norton, 1969), 71–76.

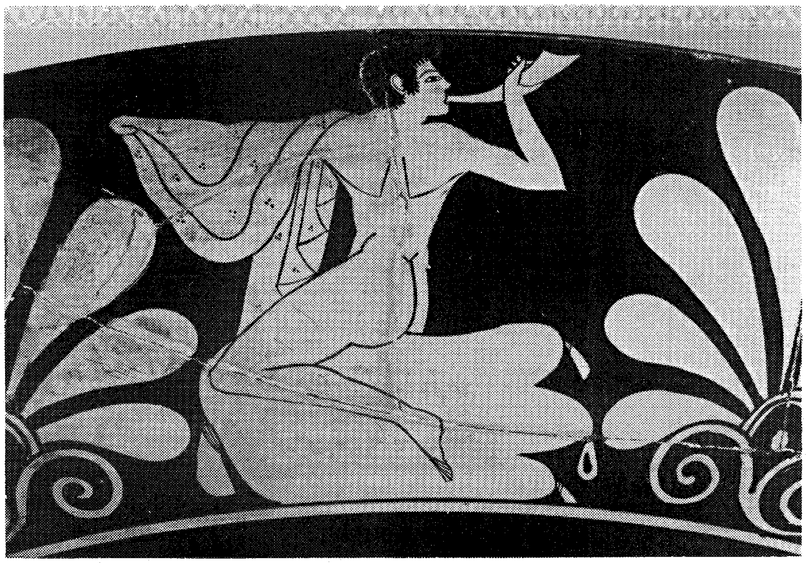
[167] See p. 154 *supra.*

[168] London, British Museum E 3.



©Copyright the British Museum

Figure 33.



© photographie Musée du Louvre—M. et P. Chuzeville

Figure 34.

Other simple pipes were also used by the Greeks and Romans for various types of signals, but little is known about them beyond occasional iconographic or literary references. In the case of the horn, for instance, after stating that smooth horns will produce the best sound, the Aristotelian *De audibilibus* (802a18–802b18) adds that baking them improves their sound because it makes them drier and harder. This sort of animal horn does indeed appear on a red-figure cup of the Scheurleer painter (figure 34), which shows a young man sounding a horn on one side, while a salpinx player answers on the other side.[169]

Horns were sometimes added to the ends of long bronze pipes to form a type of bell. This instrument, the lituus, was used in the regiments of the Romans. A curved salpinx supported by a central wooden crossbar was also used both by the Greeks, who called it a bukane (βυκάνη), and by the Romans, who called it a *cornu*. The curved salpinx is illustrated in a number of reliefs, and fragments survive from Pompeii.[170]

Chordophones

Though the wind and percussion instruments were indispensable, the stringed instruments remained most basic to the Greeks' musical culture. In the *Iliad*, the Homeric hymns, and the *Scutum Herculis*, Apollo, Hermes, and Artemis are often found playing the phorminx with a plectrum.[171] Mortals too are represented playing the phorminx in both the "Shield of Achilles" and the *Scutum Herculis*, and Pindar makes frequent reference to the instrument.[172] Plato clearly prefers the stringed instruments to the winds, while Aristides Quintilianus uses the association of the stringed instruments with Hermes and Apollo to characterize them as suitable for the education of youth—that is, for paideia—and as nurturing the rational part of the soul.[173]

---

[169] Paris, Musée du Louvre G 70. There is some room to question whether the horn is being sounded or used as a drinking horn. In the context of the salpinx player, however, it seems reasonable to assume the horn is being sounded. On this painting and the definition of the horn, see Ulrich Klein, "Das Naturhorn (κέρας) als griechisches Musikinstrument," *Gymnasium: Zeitschrift für Kultur der Antike und humanistische Bildung* 74 (1967): 139–41.

[170] On the lituus, see Curt Sachs, "Lituus und Karnyx," in *Festschrift zum 90. Geburtstage Sr. Exz. des wirklichen geheimen Rates Rochus Freiherrn von Liliencron überreicht von Vertretern deutscher Musikwissenschaft* (Leipzig: Breitkopf und Härtel, 1910), 241–46; and idem, *History of Musical Instruments*, 146–48.

[171] E.g., *Ilias* 1.603–4; *In Apollinem* 182–206 and 514–17; *In Mercurium* 17–19, 63–65, and 496–515; *In Venerem* 18–20; and *Scutum Herculis* 201–6. Several of these passages have been discussed in chapter 2 (see pp. 35–36; also p. 128 *supra*).

[172] See, for example, *Ilias* 18.490–96; *Scutum Herculis* 272–85; and Pindar *Pythia* 1.1–4, *Olympia* 3.1–10, and *Threni* fr. 129+130 (95).

[173] See pp. 159–61, 179–80, and 222. Plato *Respublica* 3.10 (399c–d), *Leges* 3 (700a–701b), and Aristides Quintilianus *De musica* 2.19 (W.-I. 91.5–92–18).

Origin, History, and Types

The first of the Nicomachean *Excerpta* tells the story of the lyre coming to the Greeks. Hermes, after he had constructed a seven-stringed lyre, taught Orpheus to play it. Orpheus in his turn taught Thamyris and Linus, while Linus taught Amphion and Heracles. When Orpheus was killed by the Thracian women, his lyre was thrown into the sea and later washed onto the shore at Antissa in Lesbos. Fishermen found it there and took it to Terpander.[174] This line of descent, of course, supports the Greeks' strong association of the stringed instruments with one of their most venerable composers. In fact, Terpander, Archilochus, Alcman, Sappho, Theognis, the tragedians, and many others do refer to one or another of the stringed instruments or are associated with them by later Greek writers, who also describe their use in everyday life.[175]

The terms applied to the stringed instruments in literary sources are variable. Nevertheless, the instruments themselves can be separated into two major classes, lyres and psalteria, each named for the instrument that embodies the most typical characteristics. Instruments of the first and more important class, named for the lyre (λύρα), have freely resonating strings strummed with a plectrum. They do not appear to have been used to play melodies, complicated or otherwise, except by a few virtuosi; rather, they gave the singer certain stable pitches—perhaps even an entire scale—to use in centering and articulating a song. In Homer and literature written in Homeric style, phorminx (φόρμιγξ) and kitharis (κίθαρις) are the common terms associated with instruments of this class. After the sixth century B.C.E., these terms are joined with increasing frequency by lyre, chelys (χέλυς), barbitos (βάρβιτος), and, finally, kithara (κιθάρα).[176]

---

[174] See map 1, p. 20. Τὴν λύραν τὴν ἐκ τῆς χελώνης φασὶ τὸν Ἑρμῆν εὑρηκέναι καὶ κατασκευάσαντα ἑπτάχορδον παραδεδωκέναι τὴν μάθησιν τῷ Ὀρφεῖ. Ὀρφεὺς δὲ ἐδίδαξε Θάμυριν καὶ Λῖνον· Λῖνος Ἡρακλέα, ὑφ' οὗ καὶ ἀνῃρέθη. ἐδίδαξε δὲ καὶ Ἀμφίωνα τὸν Θηβαῖον, ὃς ἐπὶ τῶν ἑπτὰ χόρδον ἑπταπύλους τὰς Θήβας ᾠκοδόμησεν. ἀναιρεθέντος δὲ τοῦ Ὀρφέως ὑπὸ τῶν Θρᾳκικῶν γυναικῶν τὴν λύραν αὐτοῦ βληθῆναι εἰς τὴν θάλασσαν, ἐκβληθῆναι δὲ εἰς Ἄντισσαν πόλιν τῆς Λέσβου. εὑρόντας δὲ ἁλιέας ἐνεγκειν τὴν λύραν πρὸς Τέρπανδρον, τὸν δὲ κομίσαι εἰς Αἴγυπτον (Jan 266.2–12). Jan assigned the designation *excerpta* to text preserved in the manuscripts as a "second book" of Nicomachus's *Manuale harmonices* (see pp. 406–11 *infra*). Whether they are indeed derived from the *Manuale harmonices,* Nicomachus's lost book on music, or some other source, they most probably date from the second century C.E. On Nicomachus's "lost" book on music, see Calvin M. Bower, "Boethius and Nicomachus: An Essay Concerning the Sources of *De institutione musica,*" *Vivarium* 16 (1978): 1–45.

[175] See chapter 2, *passim.*

Iconography suggests that the terms might be applied somewhat more precisely. Distinguished among the lyres can be the chelys lyre, the small, rather fragile instrument constructed on a tortoise (χέλυς) shell and used in music lessons and for private music-making; the phorminx, which comes to be applied to an instrument of moderate size with a rounded bottom, solid construction, and a tone most likely suited for smaller rooms; the barbitos, generally associated with Dionysian ceremonies, an instrument like the chelys lyre but with long arms and probably a low and very resonant tone; and the kithara, the great concert instrument of the Greeks used in contests, the theatre, and festivals and commonly associated with Apollo.

Instruments of the second class, named for the psalterion (ψαλτήριον), were plucked by the fingers and may very well have been used to play melodies. The psalteria include the psalterion itself; the epigoneion (ἐπιγόνειον) and simikion (σιμίκιον), instruments that may have had as many as forty strings, perhaps rather like the modern zither; the magadis (μάγαδις), pektis (πῆκτις), and phoenix (φοῖνιξ), instruments with strings tuned in pairs, not unlike the modern dulcimer; and the sambuke (σαμβύκη) and the trigonon (τρίγωνον), which were held aloft, like the modern Irish harp, and—especially in the case of the trigonon—played primarily by women in the home.[177]

In addition to the instruments of the two major classes, iconographic sources occasionally represent a lute-like instrument, distinct from all the others in having strings stretched over a neck. Moreover, Apulian vase painting frequently depicts an instrument that has been described by modern scholars as a seistron or a xylophone but actually seems to have been played with the same sort of technique used for the other stringed instruments. No ancient names are known for either of these instruments, but as neither appears to have been played with a plectrum, they will be considered psalteria.

---

[176] On the terminology, see Maas and Snyder, *Stringed Instruments of Ancient Greece*, 26–27, 30–31, 34–36, 39–40, 54–55, and 79–81.

[177] A similar list is provided in Pollux *Onomasticon* 4.58–61. The best treatment of most but not all of these instruments is Maas and Snyder, *Stringed Instruments of Ancient Greece*, and in this section, I have relied very heavily on their work. See also Annie Bélis, "À propos de la construction de la lyre," *Bulletin de correspondance hellénique* 109 (1985): 201–20; J[ohann] W[olfgang] Schottländer, "Griechische Leiern" (Ph.D. dissertation, Berlin, 1936); and Jean René Jannot, "La lyre et la cithare: Les instruments à cordes de la musique Etrusque," *L'Antiquité classique* 48 (1979): 469–507.

All the Greeks' stringed instruments were strummed with a plectrum or played by the fingers to produce a harmonic—in the Greek sense—background for singing and dancing or simply for enjoyment of the tone. More than one stringed instrument might play at a time, but it was more common for them to play alone or with instruments of another type. Solo instrumental music played on the stringed instruments, however, was not as important as that for the aulos.

Unlike the aerophones, membranophones, and idiophones, which embody within themselves certain characteristics of pitch, timbre, and tuning that can be restored by reconstructions, chordophones—whether plucked or struck—rely almost entirely on the type and arrangement of their strings for their sonic character. The number of strings on the lyre, phorminx, barbitos, and kithara is fairly well attested by literary and iconographic sources, but beyond that, almost nothing is preserved about the stringing and tuning of these instruments. There is no source comparable to Theophrastus's *Historia plantarum* for the strings, and only a few archaeological remains of parts of these instruments survive. Although reconstructions can be made, they remain far more hypothetical than reconstructions of any of the other instruments. In consequence, the sound and tuning of the stringed instruments is essentially unknown.[178] Nevertheless, a good deal can be concluded about the size, shape, performance practice, and social function of these instruments.

Lyres

Chelys

In the Homeric hymn *In Mercurium* 41–56, Hermes's construction of the chelys lyre is described in some detail: the soundbox—elsewhere called the echeion (ἠχεῖον)—is formed by the back of a tortoise shell, over which oxhide (δέρμα βοός) is stretched and pinned to the shell by stalks of reed (κάλαμος); two arms—the pecheis (πήχεις)—spanned by a crossbar—the zugon (ζυγόν)—extend from the shell; and seven consonant strings of sheep gut (ἑπτὰ δὲ συμφώνους ὀΐων χορδάς) are stretched from the crossbar to the bottom of the instrument. After constructing it, Hermes played the instrument with a plectrum (πλῆκτρον).[179]

---

[178] There have been numerous hypotheses on both these topics, but they have been based on only the most limited use of available sources and a great deal of airy conjecture. See n. 197 *infra*.

Similar but less detailed descriptions appear in passing in literary works such as the fragment from Sophocles's *Ichneutai*, Aristophanes's *Ranae* 228–35, Philostratus's *Imagines* 1.10.1–2, and Lucian's *Dialogi deorum* 223–24,[180] while more detailed descriptions of individual parts of lyres are preserved by Athenaeus, Pollux, Hesychius, the *Suda*, and the *Etymologicon magnum*. Taken together with the numerous iconographic representations, these provide a relatively complete view of the lyre's construction.

Construction

According to Pausanias's *Graeciae descriptio*, Mount Parthenius was the home of the best tortoises for lyres,[181] the species *testudo marginata*, the shells of which now measure 20–30 cm in length and 10–13 cm in depth. Most lyres have long since perished, but three substantial fragments of tortoise-shell soundboxes do survive: in the museum at Argos (inv. A 56, U 14, tortoises 1 and 2), in the British Museum (inv. GR 1816.6-10-501), and in the museum at Reggio.[182] The instrument in the British Museum also preserves its arms and crossbar, which—like the Elgin auloi—are made of sycamore wood. Theophrastus, however, states that the crossbars of lyres and psalteria, as well as the axles of wheelbarrows, were made of oak (πρῖνος), a harder wood less susceptible to being deformed by the tension of the strings.[183]

---

[179] For the text and a fuller discussion of this hymn, see chapter 2, pp. 35–36 *supra*.

[180] Philostratus lived in the second or third century C.E., Lucian was born ca. 120 C.E.

[181] Pausanias 8.54.7.

[182] Helen Roberts, "Reconstructing the Greek Tortoise-Shell Lyre," *World Archaeology* 12 (1981): 303–12; Bélis, "Construction de la lyre," 213, n. 25, lists several other fragments.

[183] *Historia plantarum* 5.7.6: πρῖνος δὲ πρὸς ἄξονας ταῖς μονοστρόφοις ἁμάξαις καὶ εἰς ζυγὰ λύραις καὶ ψαλτηρίοις (Hort 460).

Figure 35 provides typical front and side views of the chelys lyre, with the various parts identified.

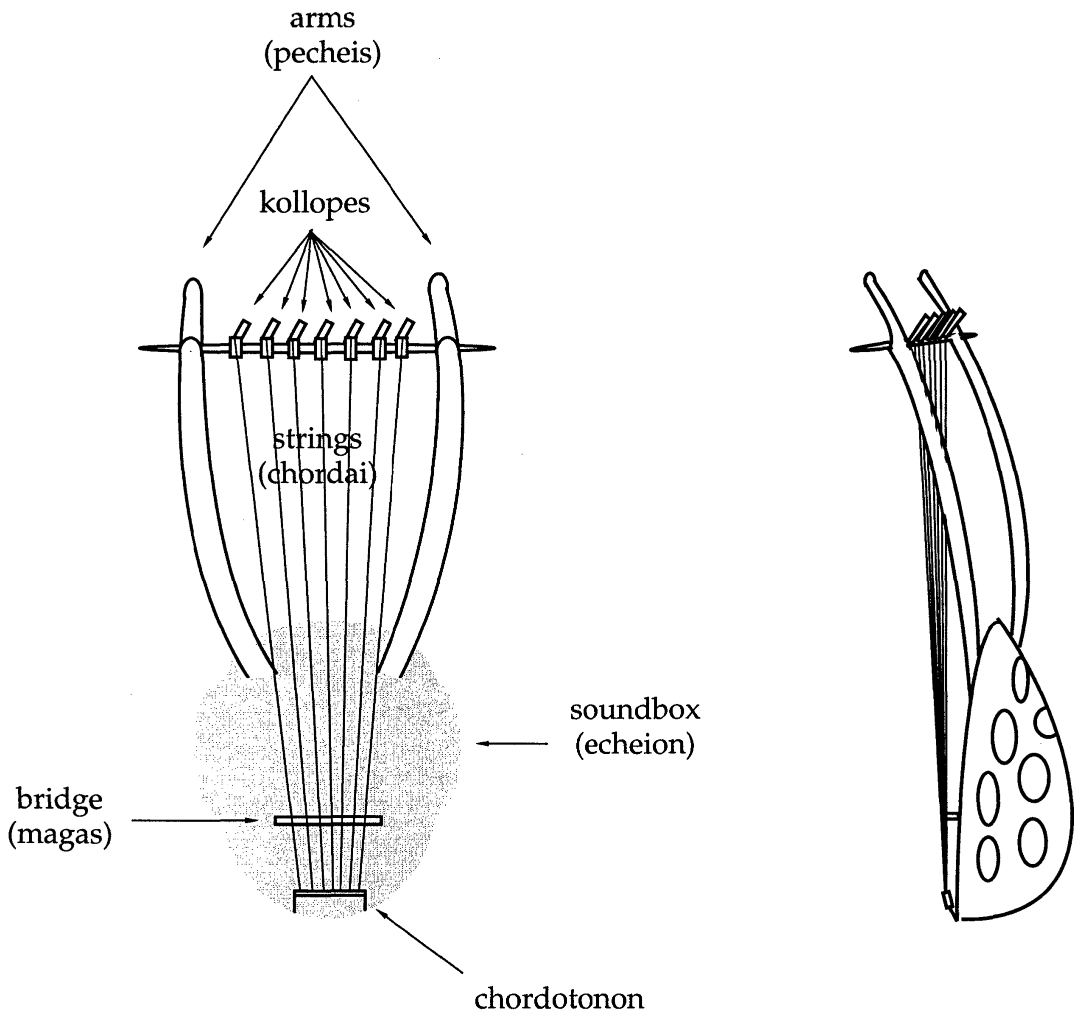


Figure 35.

The soundbox of the lyre is usually represented by the vase painters with small bulges on either side. This is not the natural shape of a tortoise shell, but it is uncertain whether the sides actually bulged or whether the painters may have been attempting to represent the upward curvature of the shell.[184] In any case, the head of the tortoise shell became the base of the soundbox, and the arms, most probably braced on a natural ledge of the shell at the opening for the animal's head, extended upwards and emerged around the location of the animal's rear legs.

---

[184] The bulges can be clearly seen in figure 29. For possible explanations, see Maas and Snyder, *Stringed Instruments of Ancient Greece*, 95.

The arms seem normally to have been made of wood, which was warped to produce the necessary curvatures. After the general shape was achieved, the arms could be filed or chiseled to produce the thinner sections sometimes displayed in vase paintings. As they emerged from the soundbox, the arms curved outward and somewhat forward; thus, when the crossbar was attached, it would not be in the same plane as the top of the soundbox. This elevation was necessary to insure that the strings would pass above the soundbox rather than lying across it.

The crossbar was fitted to the arms by means of a notch created by carving away the front of each arm from the point where the crossbar would be placed to the top of the arm. A semi-circle cut into the ledge matched the diameter of a channel cut around each end the crossbar, thus insuring that the crossbar could neither fall out nor move sideways. As the arms extended past the crossbar, they curved inward or straightened to balance their outward curvature below the crossbar. In some cases, it may have been the practice to attach the crossbar to the arms by means of a hole carved in either end of the crossbar to match the dimensions of the reduced upper part of the arms. The crossbar could then be placed over the arms, which would pass through these holes, and come to rest on the ledge. This arrangement would not only secure the crossbar from forward or lateral movement, like the other fitting, but also prevent it from turning in the notch.[185]

Some part of the bottom of the shell must have been removed, not only to facilitate the insertion of the arms but also to open the shell to the resonance of the oxhide. Nevertheless, as this opening is subsequently covered by the oxhide, its precise shape is not shown in the vase paintings. The Homeric hymn describes Hermes measuring and cutting lengths of reed, which were then fitted across the shell, their ends extending through the back of the shell. This description suggests a sort of grid, which would strengthen the shell in the absence of part of the bottom, while at the same time allowing the air to resonate freely within the soundbox. The remains of soundboxes at Argos and Reggio do indeed exhibit holes through which the ends of the reeds might have extended, and paintings of chelys lyres sometimes show dots on the lighter-colored border surrounding the soundbox that may represent the edge of the oxhide. The dots certainly suggest the ends of the reeds or some other type of pin holding the oxhide in place.[186]

---

[185] Bélis, "Construction de la lyre," 215, hypothesizes this latter arrangement as the fitting used in British Museum lyre.

The covering of oxhide that formed a resonating membrane over the soundbox was probably moistened and then stretched over the protruding ends of the reeds. When it dried, it tightened like a drumhead. The grid of reeds under the oxhide helped to maintain the shape of the shell against the tension of the oxhide and perhaps also the tension of the strings.[187]

After the soundbox and arms were constructed, the instrument could be strung. At the base of the soundbox, a bar made of metal or some other hard substance was attached, to which the strings themselves were then fastened. In chapter 6 of his *Manuale harmonices,* Nicomachus refers to such a fastener as the chordotonos (χορδότονος).[188] As the strings extended upwards to the crossbar, they slightly fanned out. Their resonance was communicated to the soundbox by a bridge resting on the oxhide; the vase painters normally pictured the bridge somewhat below the center of the soundbox. In his *Harmonica,* Ptolemy refers to the bridge used to mark off string lengths on the canon as magas (μαγάς), and Hesychius's *Lexicon* defines the magas as a wooden quadrangular board, slightly curved, which engages the strings of the kithara and produces the note.[189]

The strings themselves were made of sheep gut, according to both the Homeric hymn and the *Odyssey* (21.408). On the other hand, Pollux includes sinews, flax, thread, and twine in his list of the parts of stringed instruments, but these materials must have been used for the wrist bands, other decorations, and fastenings rather than as alternatives for the strings.[190] In any case, the strings were wound around the crossbar, their tension secured by one of two means. The earlier lyres seem to have used simply a strip of oxhide for each string. The strip was first wrapped around the crossbar, and the string was then wound onto the strip until a sufficient tension was produced to hold the hide and string in place on the crossbar. The pitch of the string could be adjusted to some degree by rotating the strip in one direction or the other to tighten or loosen the string. Red-figure vase painters often illustrate this very process, as for example on a hydria showing a teacher instructing a student in lyre playing (figure 36).[191]

---

[186] Aristophanes *Ranae* 232 also refers to the reed, which is "under the lyre" (ὃν ὑπολύριον).

[187] Roberts, "Reconstructing," 308–9.

[188] Jan 248.11. Cf. Pollux *Onomasticon* 4.62 (Bekker 157) and Manuel Bryennius *Harmonica* 2.7 (Jonker 180.2). In Athenaeus *Deipnosophistae* 14.41 (637d [Kaibel 3:407]), the part is called chordotonia (χορδοτόνια).

[189] Ptolemy *Harmonica* 1.8 (Düring 17.27, 18.2 and 6), 2.16 (Düring 80–81), 3.1 (Düring 85), and 3.2 (Düring 89.16); Hesychius, s.v. μαγάς: σανὶς τετράγωνος ὑπόκυφος δεχομένη τῆς κιθάρας τὰς νευρὰς καὶ ἀποτελοῦσα τὸν φθόγγον.

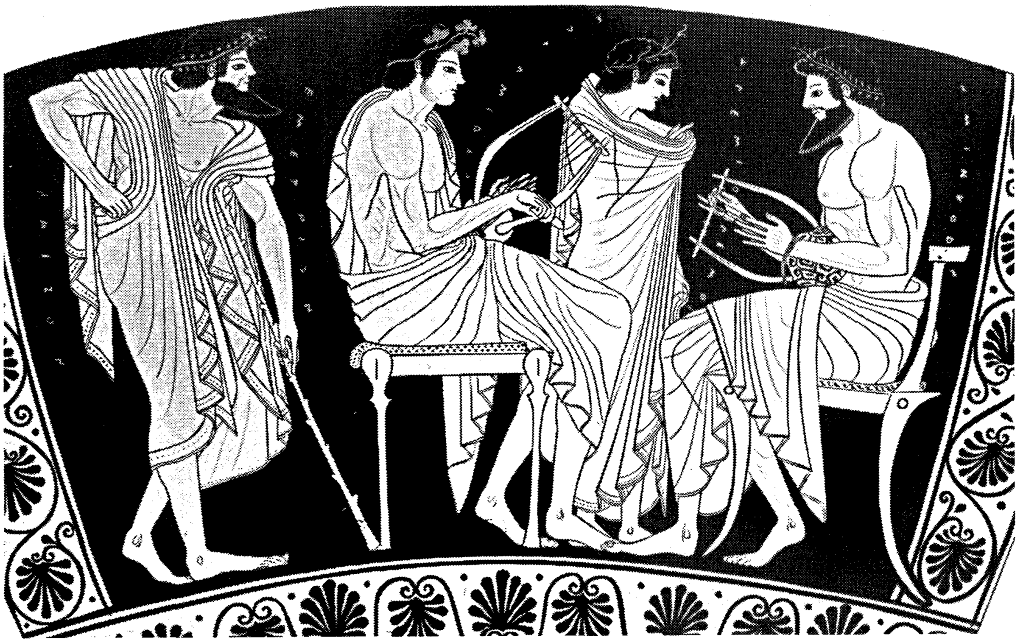


Foto Marburg/Art Resource, NY

Figure 36.

This system of fastening and tuning the strings would have been difficult and unstable, especially as the oxhide dried and loosened. From a relatively early time, a tuning peg—or kollops (κόλλοψ)—was added to the winding, and the leverage of this peg made it easier to tighten the string by pushing the kollops around the crossbar. In fact, this sort of tuning peg was already used on Sumerian and Babylonian lyre-like instruments at least as early as the third millennium B.C.E., and its principle was no doubt borrowed by the Greek instrument builders.[192] Figure 29 (see p. 213) shows the kollopes in a characteristic back view of the chelys lyre.

---

[190] *Onomasticon* 4.62: μέρη δὲ τῶν ὀργάνων νευραί, χορδαί, λίνα, μίτοι, τόνοι, πήχεις, ἀγκῶνες, κέρατα, κόλλοπες, ἠχεῖα, πλῆκτρον, χορδότονον (Bekker 157). Roberts, "Reconstructing," 311, thinks they were alternatives to sheep gut.

[191] Munich, Staatliche Antikensammlung und Glyptothek, 2421.

As the surviving fragments of the chelys lyre in the British Museum fit the instrument's general design, they provide the basis for some specific measurements. The length of the arms from the soundbox to the bottom of the crossbar is 28.5 cm, the diameter of the crossbar is 1.7 cm, and the arms extend 9 cm above the crossbar; the overall length of the arms is therefore 39.2 cm. The span of the crossbar between the arms is 27.9 cm, the arms themselves measure 2.1 cm in diameter, and the crossbar extends 4.2 cm on either side of the arms; thus, the overall length of the crossbar is 40.5 cm.[193] These dimensions are generally compatible with the proportions shown by the vase painters.

Tuning and the number of strings

Although the lyre may have had, in earliest times, only three or four strings, from at least as early as the time of Terpander, it had seven or more strings. The Homeric hymn *In Mercurium,* as already noted, referred to Hermes's lyre with its "seven consonant strings of sheep gut," and the Nicomachean *Excerpta* repeats this number.[194] In the third chapter of his *Manuale harmonices,* Nicomachus suggests that these seven strings were associated with the planetary revolutions and named hypate, parhypate, hypermese or lichanos, mese, paramese, paraneate, and neate. In the fifth chapter, Nicomachus observes that the seven strings formed two conjunct tetrachords, each of which embraced the interval of a fourth. As the interval between the lowest and highest string was a seventh, Nicomachus explains, Pythagoras added an eighth string in order to produce the overall range of an octave. He did not add this new string, however, at the top, as might have been expected, but rather between the old mese and paramese. Thus, while the old paramese was renamed trite—a name not present in the original heptachord—, it retained the same intervallic relationship with its neighboring notes: a whole tone above and a semitone below. The new string was now called paramese, separated from the mese by a whole tone and the trite by a semitone.[195] In the eleventh chapter, Nicomachus then clarifies that as the Greek scale system expanded to two octaves, two new tetrachords were needed to accommodate this range; they were added above and below the tetrachords of the old seven- or eight-string lyre. The new bottom tetrachord, which was conjunct with the old lower tetrachord, was called the hypaton, while the new upper tetrachord, likewise conjunct with the old upper tetrachord, was called the hyperbolaion. In consequence, the original tetrachords took on names as well: that from e' to a' began to be known as the meson (or, "middle"); from a' to d", the synemmenon (or, "conjunct"); and from b' to e", the diezeugmenon (or, "disjunct"). Finally, in order to complete the double octave, the proslambanomenos note (or, "added" note) was indeed added at the bottom.[196] Nicomachus is very careful not to specify the intervals between each string, but the outline of his first two systems may be deduced and represented as in figure 37.

---

[192] For example, the "Silver Lyre" excavated at Ur by Sir Leonard Wooley in 1927 and now preserved in the British Museum (U. 123554 = BM 121199). A replica of this instrument was constructed by R. R. Brown at the University of California (Berkeley) in the mid-1970s. Detailed photographs of the winding of the tuning pegs on this instrument appear in the booklet accompanying *Sounds from Silence: Recent Discoveries in Ancient Near Eastern Music* (Berkeley, California: Bît Enki Publications BTNK 101, 1976). Roberts, "Reconstructing," 307–9, presents several different possibilities for the winding of the strings around the kollopes of her reconstruction.

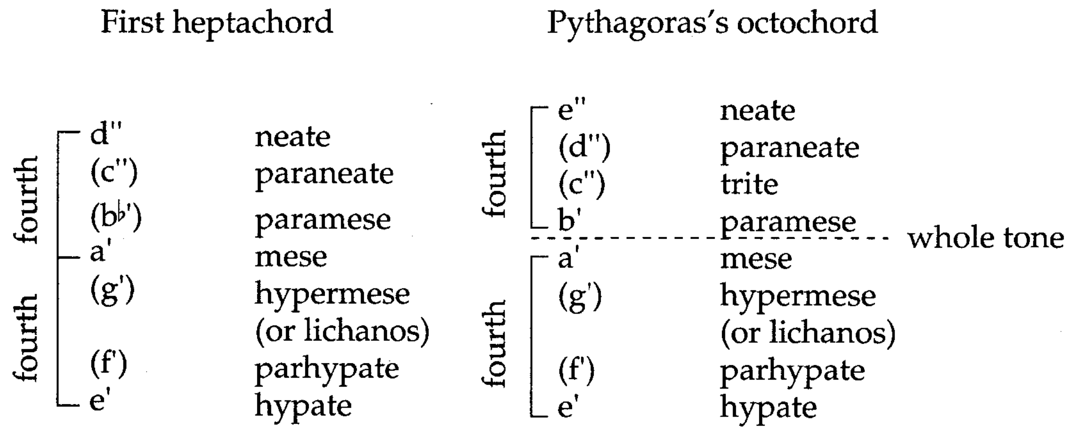
[193] Bélis, "Construction de la lyre," 213, provides measurements, but they do not accord with her photograph.

[194] See n. 174 *supra* and G. Huxley, "A Note on a Seven-Stringed Lyre," *Journal of Hellenic Studies* 90 (1970): 196–97.

---

[195] Boethius (*De institutione musica* 1.20) describes this same process for the addition of the eighth string but attributes it to Lycaon of Samos. If this part of Boethius's treatise is indeed derived from Nicomachus's lost *musica*, it seems odd that it would not concur with Nicomachus's *Manuale harmonices* in attributing the addition of the string to Pythagoras. In his annotation to this passage (Boethius, *Fundamentals of Music*, 32–33), Bower suggests that Lycaon may have been a cultic name for Pythagoras in late antiquity.

[196] Nicomachus *Manuale harmonices* 3, 5, 11 (Jan 241–42, 244–45, 255–60). Bryennius *Harmonica* 1.1 repeats Nicomachus's explanation, but with some elaboration. As Nicomachus explains it, there may have been a time when the hypaton, meson, synemmenon, and hyperbolaion tetrachords, all conjunct, formed a thirteen-tone scale. It would presumably have spanned a minor thirteenth. In this instance, the mese is indeed still the middle note of the scale, and there is no proslambanomenos. For a full explanation of the meaning of these note names and the construction of the Greek scales, see chapter 5; and Marcelle Duchesne-Guillemin, "Survivance orientale dans la désignation des cordes de la lyre en Grèce?" *Syria* 44 (1967): 233–46.



(Pitches are assigned according to the common modern pitching for the Greater Perfect System. Pitches in parentheses represent the possible diatonic tuning, but this is not specified by Nicomachus.)

Figure 37.

Nicomachus's explanation may very well represent something close to the actual manner in which the early lyres were strung and tuned. It would have been a simple matter to tune the two conjunct fourths of the heptachord or the octave and two disjunct fourths of the octochord. Nevertheless, there are other explanations. The Greeks commonly referred to the intervals of a fourth and a fifth as diatessaron (διὰ τεσσάρων) and diapente (διὰ πέντε)—because these intervals presumably ranged "through four strings" or "through five strings"—, but with a few exceptions, they called the octave "diapason" (διὰ πασῶν), that is, "through all the strings," rather than diocto (δι' ὀκτώ) as might be expected. In response to a question about this anomaly, the Aristotelian *Problemata* (19.32) assert that Terpander tuned the lyre so that the seven strings would span an octave; thus, the octave ranged "through all the strings" rather than "through eight strings." Although the names of the Greek notes, their precise orders, and their relationship one to another were certainly still evolving in Terpander's day, the *Problemata* state that this feat was accomplished by omitting the trite and adding the nete. This probably suggests an arrangement in which the lower tetrachord spanned a fourth, while the upper tetrachord spanned a fifth.[197]

The arrangement of the notes of the heptachord or octochord on the lyre is not certain, although it has been generally assumed that they ranged left to right (as viewed facing the instrument) from hypate to neate. Inasmuch as the instrument tends to be held at an angle of 45°–90° from the performer's torso when being played, if the strings were viewed as a ladder, the hypate would fall at the top and the neate at the bottom. In fact, Plutarch's *Platonicae quaestiones* 9.2 refers to this arrangement in its commentary on the parts of the soul:

> Or is it ridiculous to distribute first, middle, and last things to particular positions? For we see that on the lyre, the hypate occupies the highest and first position, while on the auloi, it occupies the lowest and last position. Moreover, the mese—wherever placed on the lyre tuned in the same manner—sounds higher than the hypate and lower than the nete.[198]

---

[197] In a fifteenth-century manuscript at the Biblioteca nacional in Madrid (Matritensis gr. 4621), two little canons appear on ff. 134r–136r. In the first of these (ff. 134r–135r), which is otherwise very much like the explanation of Nicomachus (Jan 241–42), the discovery of the relationship between the planets and the seven strings of the lyre is attributed to Orpheus. In the second (ff. 135v–136r), Pythagoras's expansion of the scale to an octave is attributed to his discovery of the consonant fifth. The texts are edited and translated in Charles-Emile Ruelle, *Deux textes grecs anonymes concernant le canon musical heptacorde puis octacorde publié d'après le Ms. N-72 de la Biblioteca Nacional de Madrid avec une traduction française et des notes* (Paris: Baur, 1878).

Elaborate hypotheses about a pentatonic tuning for the lyre have been advanced by Curt Sachs, "Die griechische Instrumentalnotenschrift," *Zeitschrift für Musikwissenschaft* 6 (1923–24): 289–301; idem, *Rise of Music*, 203–5; and Otto J. Gombosi, *Die Tonarten und Stimmungen der antiken Musik* (Copenhagen: E. Munksgaard, 1939). Gustave Reese, *Music in the Middle Ages* (New York: W. W. Norton, 1940), 25–39, adopts the general theory of Sachs and Gombosi. R. P. Winnington-Ingram, "The Pentatonic Tuning of the Greek Lyre: A Theory Examined," *Classical Quarterly* n. s. 6 (1956): 169–86, provides a detailed refutation of the hypotheses of Sachs and Gombosi.

[198] Ἢ τὸ μὲν τοῖς τόποις ἀπονέμειν τὰ πρῶτα καὶ τὰ μέσα καὶ τὰ τελευταῖα γελοῖόν ἐστιν, αὐτὴν τὴν ὑπάτην ὁρῶντας ἐν μὲν λύρᾳ τὸν ἀνωτάτω καὶ πρῶτον ἐν δ' αὐλοῖς τὸν κάτω καὶ τὸν τελευταῖον ἐπέχουσαν ἔτι δὲ τὴν μέσην, ἐν ᾧ τις ἂν χωρίῳ τῆς λύρας θέμενος ὡσαύτως ἁρμόσηται, φθεγγομένην ὀξύτερον μὲν ὑπάτης βαρύτερον δὲ νήτης; (1008e [text from *Plutarch's Moralia*, 13/1:98, 100]). On the aulos, of course, movement from higher to lower pitches would be produced by closing successive holes, moving down from the top to the bottom of the instrument.

As lyres developed, subsequent strings were added. The Nicomachean *Excerpta* 4 ascribes the ninth string to Prophrastus of Pieria, the tenth to Histiaeus of Colophon, and the eleventh string to Timotheus of Miletus. Others added additional strings, to a total of eighteen. On the other hand, the *Cheiron* of Pherecrates associates the excesses of a twelve-string lyre with Melanippides and Timotheus.[199]

Performance practice and the plectrum

When played, the chelys lyre was held by means of a band attached to the lower right arm of the instrument, as viewed from the front. The band passed over the performer's left wrist, with the bottom of the instrument resting on the performer's hip or sometimes braced between the side of the body and an elbow (see figure 36). In fact, however, the lyre is frequently painted being carried rather than played, and its use in vase painting is probably as much emblematic as iconographic. In a few cases, the end of the wrist band attached to the arm of the lyre is decorated with a sash or tassel.

The vase painters provide a good deal of evidence about the plectrum. It was attached to the instrument by a long cord and normally held between the thumb and index finger of the right hand when strumming the lyre. Strumming seems to have combined an arm and wrist movement outward, away from the performer, never inward towards the performer. The body of plectrum is often represented accommodating itself to the contour of the performer's hand; thus, it would seem to have had a somewhat flexible body. The head of the plectrum, by contrast, was made of a hard material such as ivory, horn, metal, or bone.[200] When not in use, the plectrum was either tucked between the strings and the soundbox, just above the bridge, or between the base of one of the arms and the soundbox, or it dangled from its cord, which was wrapped several times around one the of lyre's arms.

After—or perhaps while—the strings are strummed, the performer manipulates them in some way with the fingers of the left hand, which are usually represented as extended just behind the strings. There is insufficient evidence to determine precisely the function of the left hand, but it seems reasonable to suppose that the fingers might dampen certain strings to prevent them from sounding or might pluck some of the strings to emphasize certain pitches.[201] It is also possible that the fingers might lightly touch one or more of the strings to produce harmonics. Movement of the left hand was, however, restricted by the wrist band that supported the instrument. While the fingers of the hand could move and the hand itself might rotate, the arm could not make sudden movements towards the left or right side of the instrument without upsetting its balance.[202]

---

[199] See chapter 2, pp. 66–67 *supra*.

[200] See Plato *Leges* 7 (795a) and Euripides *Ion* 881–85.

Social function

As instruction in playing the lyre was a basic part of Athenian education, men and women could employ the instrument for simple recreation, the accompaniment of dancing, music in wedding ceremonies, or singing at symposia. The lyre was also employed in contests, and boys are often pictured learning to play the lyre, face-to-face with their instructors. One of the most famous of these representations is the red-figure painting by Douris on a kylix of ca. 470 B.C.E. (figure 38).[203]

The lyre serves an emblematic function in mythological scenes or scenes of death. In mythological scenes, the lyre may stand as a symbol for Apollo, Hermes, the Muses, Castor and Pollux, Paris, Eros, or youths pursued by Eos; in scenes of death, the lyre perhaps symbolizes the tranquility of Elysium.[204]

---

[201] Sachs, *History of Musical Instruments*, 132–33, remarks on his observation of Nubian lyre players who strum the strings with a plectrum while the fingers of the left hand dampen those that are not to sound.

[202] Philostratus *Imagines* 6 states that the left hand strikes the strings with straight fingers. Maas and Snyder, *Stringed Instruments of Ancient Greece*, 63–64, 92–93, and 122, cite specific vase paintings that illustrate various left-hand techniques.

[203] Berlin, Staatliche Museen F 2285.

[204] Maas and Snyder, *Stringed Instruments of Ancient Greece*, 36–39 and 81–91 (and accompanying plates), provide numerous examples of such scenes.

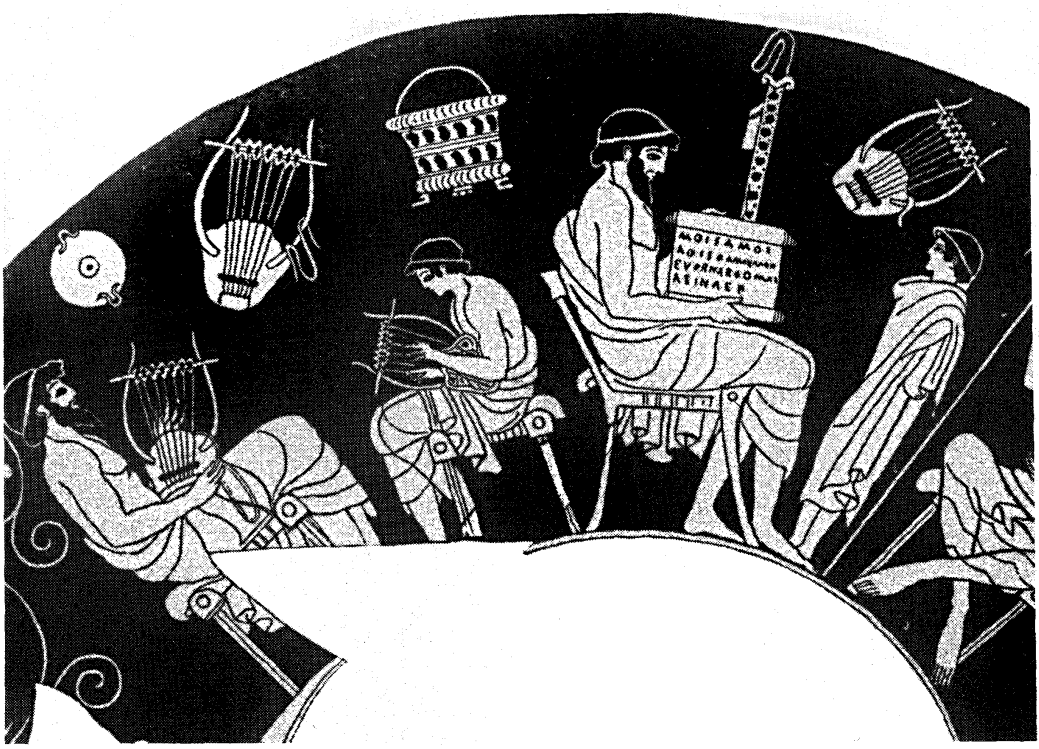


Foto Marburg/Art Resource, NY

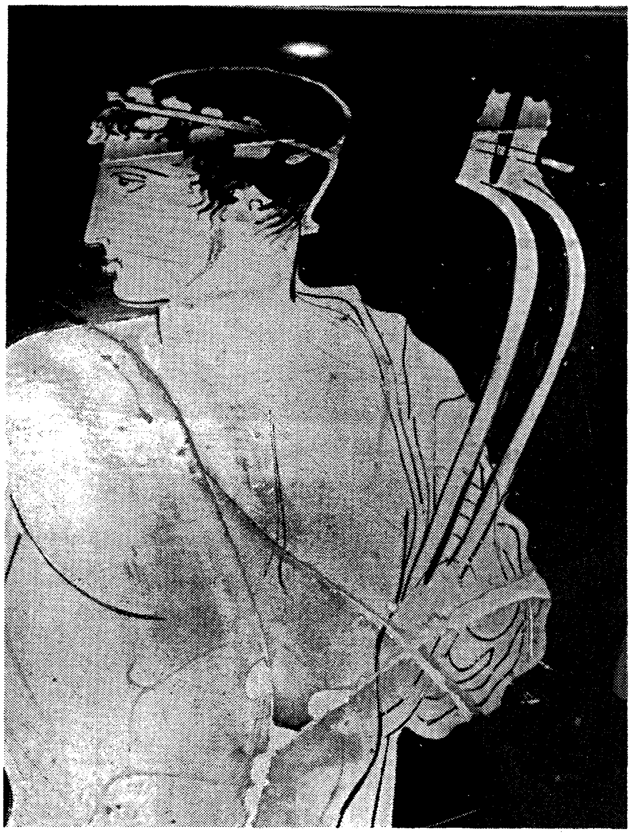
Figure 38.

Barbitos

In general structure and design, the barbitos is nearly identical to the chelys lyre, although its arms are considerably longer and emerge from the soundbox at sharper angles to the left and right. The upper arms of the barbitos are usually represented with a sharp inward curvature just below the crossbar. This ostensible left and right lateral curvature of the arms as represented by the vase painters may in fact have been the means of showing a sharper forward curvature. In one of the rare side views of the instrument, the forward curvature is clearly illustrated (figure 39).[205] At the point of the crossbar and above, vertical blocks provide some sort of fitting to hold the crossbar in place. In a few paintings, these blocks show traces of a slot or notch, and it is likely that the crossbar was fitted to the barbitos in the same manner as it was to the chelys lyre.

---

[205] Brussels, Musées royaux d'art et d'histoire, Inv. No. A 3091. See also figure 12, p. 165, and figure 40, p. 252 *supra*.



Musées royaux d'Art et d'Histoire–Brussels, Inv. No. A 3091

Figure 39.

Among illustrations of the barbitos in which the number of strings can be counted with reasonable certainty, about half show it with seven strings. Somewhat fewer have five or six, while only a few have eight.[206] If it is assumed that these strings were comparable to the strings of the chelys lyre and were tuned with comparable tension, the overall pitch of the barbitos would have been lower. The instrument may therefore have been a sort of tenor lyre. In fact, the *Etymologicon magnum* states that the instrument emits a low sound and explains its name as derived from *barumitos* (βαρύμιτος), that is, *baru,* low, and *mitos,* string.[207] It is certainly possible that the instrument was tuned an octave lower than the chelys lyre, but it is more likely that it was simply tuned to accommodate whatever range would be most comfortable for a particular occasion.[208]

---

[206] Maas and Snyder, *Stringed Instruments of Ancient Greece,* 124.

[207] *Etymologicon magnum,* s.v. βάρβιτος (188.17–22). In the Roman period, the instrument was commonly called a barbiton. On the etymology of the term, see Jane McIntosh Snyder, "The *Barbitos* in the Classical Period," *Classical Journal* 67 (1972): 331–32.

The general manner of holding and playing the instrument would seem to be identical to that of the chelys lyre. Its sound, like the lyre's, is regularly described as clear. Sometimes the sound is described as chattering or chirping, most probably in response to the articulation of each string as it is strummed by the plectrum or plucked by the fingers of the left hand.

The instrument is not mentioned by Homer, the Homeric hymns, or Hesiod, but the word does appear in one of its variant forms in an Alcaeus fragment that speaks of the merry playing of the barbitos at a symposium.[209] Unlike the chelys lyre, the invention of the barbitos is firmly attributed to mortals. Pindar names Terpander as the inventor, while later writers tend towards Anacreon.[210] The association of Alcaeus with the barbitos is enlarged to include Sappho by a red-figure kalathoid (figure 40) of the fifth century B.C.E., which shows both of them holding barbitoi.[211] Thus, like the chelys lyre, the barbitos must have come to the mainland of Greece from Lesbos. Unlike other stringed instruments, however, it is not pictured in black-figure vase paintings as frequently as in red-figure paintings; this suggests that the barbitos was not common on the mainland until the fifth century B.C.E.[212]

---

[208] Snyder ("*Barbitos,*" 335–36) reviews the two passages in Athenaeus *Deipnosophistae* that have been interpreted—unconvincingly—by modern scholars as an indication that the barbitos was tuned an octave lower than the pektis.

[209] Fragment 70.3–5: ἀθύρει πεδέχων συμποσίω . [| βάρμος, φιλώνων πεδ' ἀλεμ[άτων | εὐωχήμενος αὔτοισιν ἐπα[(*Oxyrhynchus papyrus* 1234 [*Greek Lyric,* 1:274]). Athenaeus *Deipnosophistae* 4.80 (182f [Kaibel 1:398]) and 14.38 (636c [Kaibel 3:404]), on the authority of Euphorion and Phillis of Delos, uses barmos (βάρμος)—the term of the Alcaeus papyrus—and baromos (βάρωμος) as alternative names for the barbitos.

[210] Pindar *Encomia* fr. 125 + 126; Athenaeus *Deipnosophistae* names Anacreon on the authority of Neathes of Cyzicus at 4.77 (175e) and at 13.74 (600d–e) records a fragment of Critias in which Anacreon is praised as "a rival of the auloi, a lover of the barbitos" (αὐλῶν ἀντίπαλον, φιλοβάρβιτον). The association of the barbitos with Anacreon is underscored by prominent references to the instrument in poems 2, 15, 23, 43, and 60 of the so-called *Anacreontea;* these are, in a sense, tributes to Anacreon but were not authored by him. For a useful introduction as well as text and translation, see *Greek Lyric,* 2:4–20 and 162–247.

[211] Munich, Staatliche Antikensammlungen und Glyptothek, 2416.

[212] See Snyder, "*Barbitos,*" 331–40.

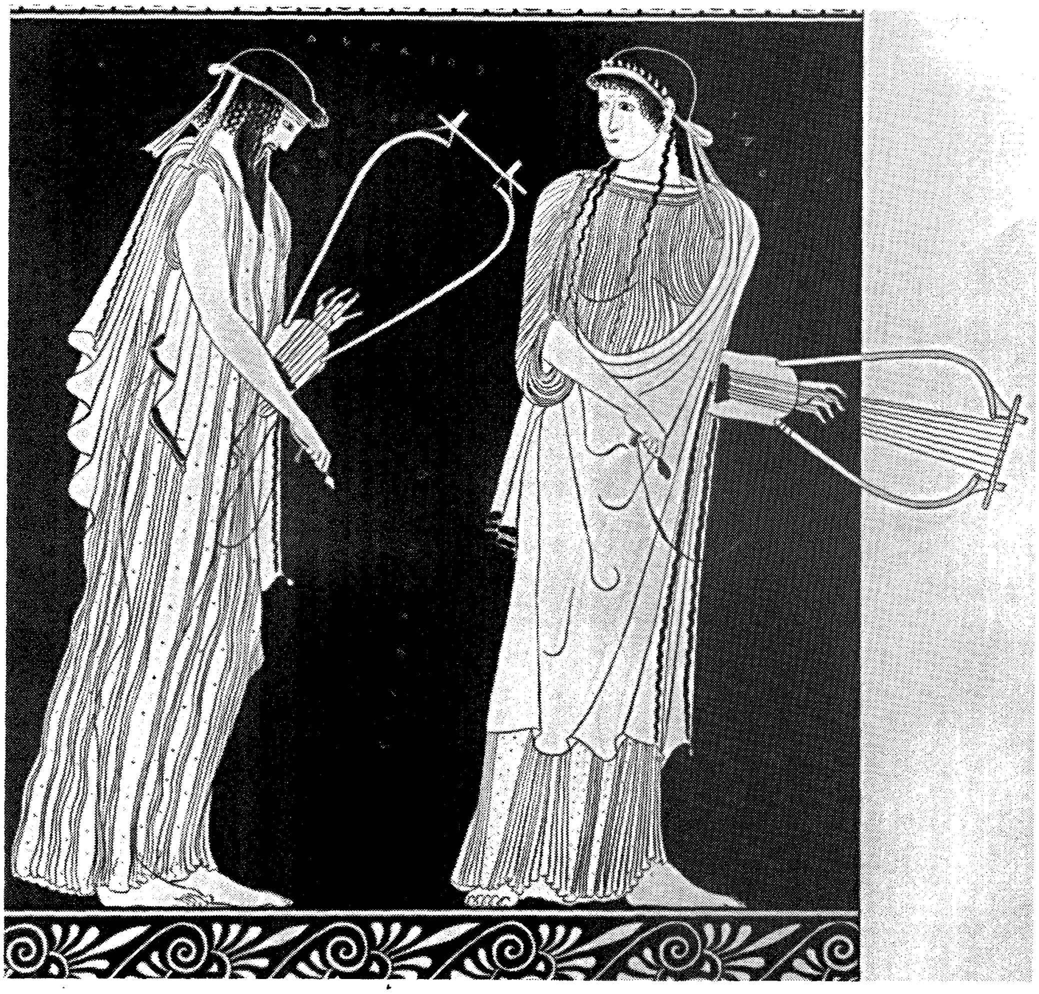


Foto Marburg/Art Resource, NY

Figure 40.

Although the invention of the barbitos may have been traditionally assigned to mortals, the instrument is strongly associated with Dionysus. Vase painters show it in the symposia, the komos, erotic scenes, and scenes of dancing and bibulous revelry. Dionysus is certainly not visible in all these scenes, but his presence is suggested by the satyrs and bacchantes, who dance, carry kylikes, and play the auloi and barbitoi. Moreover, the scenes themselves are often painted on wine vessels (such as the krater, amphora, stamnos, kylix, skyphos, and oinochoi). In some cases, Eros appears, either holding a barbitos or in scenes with a man and a woman, where one of them holds or plays the barbitos. The relationship between the barbitos and dancing is further stressed in Euripides's *Cyclops* (37–40), where Silenus remarks that the sikinnis, the satirical dance in honor of Dionysus, was accompanied by the barbitos.[213]

The barbitos is occasionally shown with the Muses or in pedagogical scenes, but Aristotle, in his *Politica* (8.6 [1341a16–1341b18]), states that the barbitos—like the aulos, trigonon, sambuke, and so on—was not suitable for education: its purpose was to give pleasure. The social institutions with which it was associated, especially the komos and the symposium, defined and circumscribed its role. Unlike the other lyres, the barbitos appears in vase painting with decreasing frequency until the end of the fifth century B.C.E. Although Aristotle refers to the barbitos in the fourth century, the instrument must have declined as the traditions of the komos and symposium changed and waned.[214]

Phorminx

"Phorminx" has already been noted as the general term for instruments of the lyre class in the earliest Greek literature, and it would be incorrect to assume that a particular instrument of only one size and shape is intended when the term—and the related verbal form φορμίζειν—appears in the *Iliad* and the *Odyssey*, the Homeric hymns, and elsewhere. Nevertheless, a lyre with a rounded base and straight, fairly substantial arms is already depicted in painting and statuary prior to 800 B.C.E., and while these may be generalizations of characteristics rather than precise representations of a specific instrument, it is reasonable to assume that characteristics of the earliest lyres were preserved in the typical round-bottom lyre commonly represented in much younger art.[215]

The phorminx was strongly associated with Apollo and the Muses, the Homeric heroes, and the bards Phemius and Demodocus. Although used to accompany the feasts and weddings of the gods, it could also be used on more private occasions. For example, when the emissaries of Agamemnon meet with Achilles, they find him amusing himself by playing a phorminx taken from the Trojan plunder:

---

[213] Cf. Lucian *De saltatione* 22 and 26; and chapter 2, p. 101 *supra*.

[214] For a fuller description of the social uses of the barbitos, see Maas and Snyder, *Stringed Instruments of Ancient Greece*, 113–28 and accompanying plates; and Jane McIntosh Snyder, "Aegisthos and the Barbitos," *American Journal of Archaeology* 80 (1976): 189–90.

[215] For a review of these very early representations, see Maas and Snyder, *Stringed Instruments of Ancient Greece*, 1–23.

> Now they came beside the shelters and ships of the Myrmidons
> and they found Achilles delighting his heart with the clear-sounding
> phorminx
> beautiful and carefully wrought with a silver crossbar
> which he won out of the spoils when he ruined Eëtion's city;
> with this he delighted his spirit and sang of the fame of men.[216]

Until the fifth century B.C.E., when the barbitos becomes the instrument commonly associated with Dionysus, vase painters also show the phorminx in the company of Dionysus and in komos scenes. In at least one case, both the barbitos and the phorminx are represented in a single komos scene.[217] In earlier paintings, the instrument is played by men, but in somewhat younger paintings (beginning in the late sixth century B.C.E.), the instrument is found in the hands of bacchantes as well as Muses.

The phorminx was constructed of wood, and some of them were decorated with ivory or gold facings. A few Mycenean (ca. 1550–1100 B.C.E.) fragments, surviving from a tomb at Menidi and Mycenae, include facings for parts of the right and left arms and perhaps part of the crossbar. From these pieces, it is possible to estimate that the earliest phorminxes were 60–75 cm in height;[218] this dimension also accords reasonably well with much later illustrations, as for example the white-ground illustration of one of the Muses playing the phorminx on Mount Helicon (figure 41).[219]

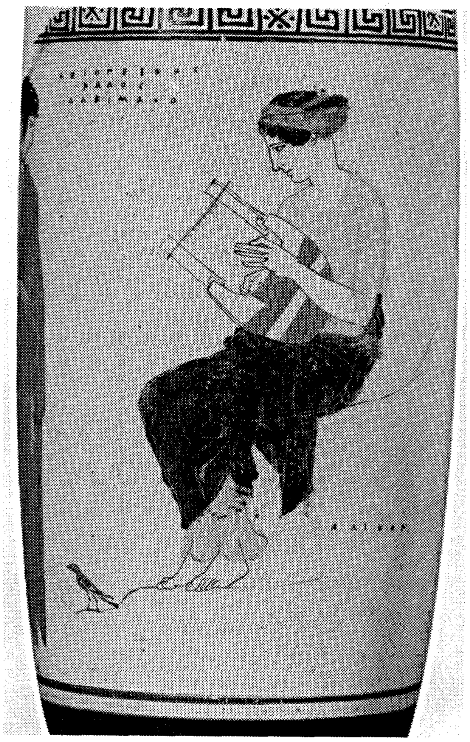
---

[216] *Ilias* 9.185–189: Μυρμιδόνων δ' ἐπί τε κλισίας καὶ νῆας ἱκέσθην, | τὸν δ' εὗρον φρένα τερπόμενον φόρμιγγι λιγείῃ, | καλῇ δαιδαλέῃ, ἐπὶ δ' ἀργύρεον ζυγὸν ἦεν· | τὴν ἄρετ' ἐξ ἐνάρων πόλιν Ἠετίωνος ὀλέσσας· | τῇ ὅ γε θυμὸν ἔτερπεν, ἄειδε δ' ἄρα κλέα ἀνδρῶν. For additional examples, see chapter 2, pp. 35, 37, 128, 134, and 137–38 *supra*.

[217] Munich, Staatliche Antikensammlungen und Glyptothek, 1416 (reproduced in Maas and Snyder, *Stringed Instruments of Ancient Greece*, 156, figure 2).

[218] Maas and Snyder, *Stringed Instruments of Ancient Greece*, 8.

[219] Munich, Staatliche Antikensammlungen und Glyptothek, ex Schoen 80.



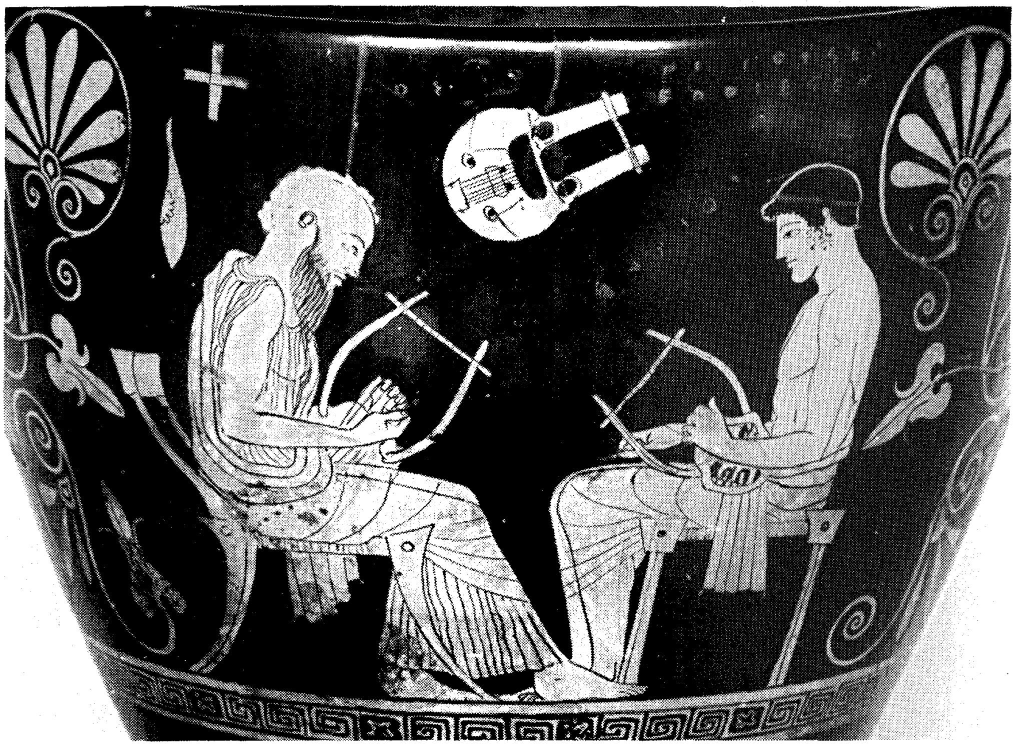
Staatliche Antikensammlungen und Glyptothek München
Aufnahme: C. H. Krüger-Moessner

Figure 41.

As illustrated in figure 41,[220] the arc of the bottom of the soundbox is matched by a smaller concave arc on the top. Moreover, the two arcs extend upwards to form an unbroken line with the lower part of the arms, which are clearly constructed in at least two sections. Vase painting of the fifth century B.C.E. and later generally shows the upper arms of the phorminx offset towards the center of the instrument. This suggests some sort of tongue-and-groove fitting. In a painting on a red-figure skyphos of the early fifth century B.C.E., however, a brace spans the upper concave arc, perhaps for structural support over the entire instrument, and the upper arms are attached to the brace. This painting, which illustrates Linus instructing Iphicles on the chelys lyre—with the phorminx hanging on the wall in the background—, also provides an excellent example of performers employing a left-hand technique with curved fingers, a hand position perhaps used when individual strings were plucked or struck rather than damped (figure 42).[221]

---

[220] See also figure 29 (p. 213) and 42 (p. 256), where the phorminxes hang on the wall in the background.



Staatliches Museum Schwerin

Figure 42.

At the base of the upper arms of phorminxes, where they are fitted to the lower arms, a circle or semicircle is often shown. If the upper arms were hollow, as their size would certainly allow, they could function as additional soundboxes, and these circles might well be soundholes. The few side views of phorminxes indicate that the arms tilted forward slightly, approximating the forward curvature found on the other lyres.

Many illustrations of the phorminx feature a pair of circles or eyes on the soundbox (see figure 42). As they are generally located near the bridge, these could be additional soundholes.

The top and especially the bottom of the soundbox may have been constructed of several pieces, which would have allowed them to be warped or curved in the process of jointing. The multiple colors shown on the back of the phorminx in figure 41 could represent the different sections, but they may simply represent an ivory inlay or some other decoration. It is quite possible that the top and bottom of the soundbox, like those of the modern guitar, were flat and glued onto the sides, which were warped to match the perimeter of the instrument. The back of the soundbox may have bulged somewhat but probably not any more than tortoiseshell soundboxes. The position of the Muse's arm in figure 41, for example, does not suggest that she is reaching over a very deep soundbox.

---

[221] Schwerin, Staatliches Museum, Kunstsammlungen, KG 708. The artist is the so-called Pistoxenus Painter. Linus was supposed to have taught Amphion and Heracles to play the lyre (see p. 235 *supra*), and in one version of the story, Heracles killed Linus for scoffing at his awkwardness with the lyre. Iphicles was the twin brother of Heracles.

The phorminx's crossbar, unlike the other lyres, was installed close to the top of the arms or indeed, in some cases, at the very top of the arms. On the other hand, the bridge and chordotonon were like those of the other lyres; kollopes too are shown in some but not all illustrations of the instrument.

Even very early representations of round-bottom instruments show them with seven strings, like the other lyres, though there are early illustrations with four and six strings. Vase paintings from the fifth century or a bit later continue to show the instrument with seven strings, but a few representations have five, six, eight, or ten.[222]

The phorminx was held and played in the same manner as the other lyres, but its specific tuning, of course, remains in question. If comparable strings and string tension could be assumed for all the lyres, the size of the phorminx might suggest a register a bit lower than the chelys lyre but higher than the barbitos or the kithara.

The association of the phorminx with Apollo and the Muses, Dionysus and his attendants, and the Homeric heroes gave the instrument a particular emblematic status, and in vase paintings of mortal musicians, the phorminx is more likely to be found hanging on the wall than in the hands of a performer. It may reasonably be assumed that the round-bottom phorminx gave way to the chelys lyre for musical education and general music-making, to the barbitos for sacred and social occasions commonly associated with Dionysus, and for the most formal musical occasions, to the kithara.

---

[222] For a fuller survey of the phorminx, see Maas and Snyder, *Stringed Instruments of Ancient Greece*, 139–45. Maas and Snyder (p. 139) reject the designation of the fifth-century phorminx as "Wiegenkithara" (cradle-kithara) by some modern scholars.

Kithara

The kithara was the largest and most impressive of the Greek stringed instruments. As would be expected, it is frequently shown in black-figure vase paintings in the company of Apollo, Artemis, Hermes, and Leto, but it also appears in scenes with Dionysus, Athena, Poseidon, and Heracles. In the hands of mortals, the kithara is more often to be found in red-figure vase paintings, which usually illustrate the professional kitharode in his elaborate costume. Musical competitions are suggested by those scenes in which the performer is mounting or standing on a platform; in some of these, the painter shows listeners or a winged Nike handing a kithara to the performer.

The kithara must have been used to provide some of the music on sacred and festal occasions, especially for sacrificial processions, hymns, and paeans. One of the surviving panels from the Parthenon frieze, for example, depicts two kithara players who formed a part of the procession that originally extended around the temple in the frieze. Processions with kitharists and auletes are also illustrated on two black-figure vases from the Acropolis.[223] A particular type of scene commonly including the kithara is the quadriga scene. These scenes show formal processions with a chariot drawn by four horses, alongside which the kitharist walks with his instrument. One or two figures ride in the chariot, while others precede and follow it. In some of these scenes, the walking figures are most probably intended to be Apollo (with the kithara), Dionysus, Artemis, or some other god; a single figure in the chariot might be any of these gods or Athena. If there is a pair of figures in the chariot, it could be one of the familiar pairs of Peleus and Thetis, Zeus and Hera, Dionysus and Ariadne, or Athena and Heracles. It is also quite possible that the pair in the chariot might be a mortal couple, while the attendants could be either some combination of gods or a group of friends.[224] In addition to this iconographic evidence, Proclus's *Chrestomathia* observes that the kithara was used to accompany the singing of a hymn at the conclusion of the procession, and the instrument appears as a specific musical allusion in numerous hymns and paeans.[225]

---

[223] Acropolis 816 and 2009. The Parthenon frieze was carved between 447 and 432 B.C.E.

[224] See Maas and Snyder, *Stringed Instruments of Ancient Greece*, 56–57.

Apart from its use in sacred and festal ceremonies, the kithara was important in the theatre and particularly in the competitions that formed a part of the great national festivals. Michael Psellus's *De tragoedia* 12 observes that the kithara was used in the tragedies of Sophocles and Euripides, and indeed, the strumming sound of the instrument is parodied in Aristophanes's *Ranae*, where it is, however, associated with Aeschylus.[226] In any event, Sophocles was well known as a virtuoso kitharist, and he is said to have played the title role in his own tragedy *Thamyris*, now lost. The story of Thamyris, a Thracian kitharist who was punished with blindness for his arrogance in challenging the Muses to a contest,[227] has affinities with the contest between Apollo and Marsyas and would have provided Sophocles with the opportunity of accompanying himself on the kithara in a spectacular monody. Euripides, too, makes numerous references to the kithara that suggest the instrument would have been present in the theatre.[228]

The musical competitions at the national festivals encouraged the development of the kithara as the preeminent stringed instrument of the virtuoso,[229] and competitors might win an amphora filled with olive oil or some other prize. As it was common for the paintings on these prize amphorae to represent the victor's type of competition, they provide a good deal of iconographic evidence about the instrument and the special costume, the epiporpama (ἐπιπόρπαμα), worn by kitharists in imitation of Apollo.[230]

---

[225] See chapter 2, pp. 30, 35–36, 42–43, and 47–48 *supra.*

[226] See chapter 2, pp. 102, 109, and 123 *supra.*

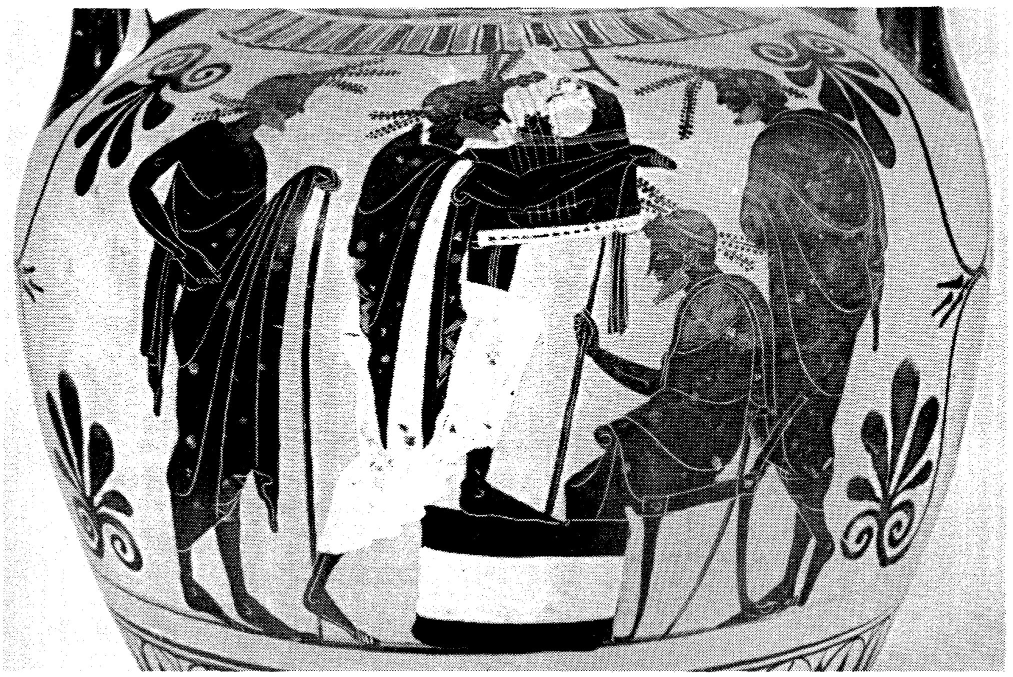
[227] *Ilias* 2.594–600.

[228] See chapter 2, pp. 102, 110 *supra.* See also Jane McIntosh Snyder, "*Aulos* and *Kithara* on the Greek Stage," in *Panathenaia: Studies in Athenian Life and Thought in the Classical Age,* ed. T. Gregory and A. Podlecki (Lawrence, Kansas: Coronado Press, 1979), 75–95. On the possible relationship between Sophocles's *Thamyris* (produced perhaps ca. 460 B.C.E.) and a special type of "kithara" that appears in several vase paintings of the fifth century, see pp. 266–67 *infra.*

[229] See chapter 2, pp. 33, 35, 42–43, 47–48, 58–71, and 74 *supra.* On the special practice of solo kithara playing at the competitions, see *infra.*

[230] Proclus's *Chrestomathia* particularly attributes "using a splendid robe and taking up the kithara in imitation of Apollo" to Chrysothemis the Cretan (see chapter 2, p. 61 *supra*).

When the kitharist or kitharode is represented by the vase painters, he is frequently in the company of judges; sometimes they appear in the same scene, and on other occasions, they appear in a second painting on the reverse side of the vase. A black-figure amphora in the British Museum, for example, shows a contestant stepping onto a small platform surrounded by three other figures, one of which is seated. The seated figure is holding a staff, as is at least one of the standing figures, and this may indicate their role as judges (figure 43).[231]



©Copyright the British Museum

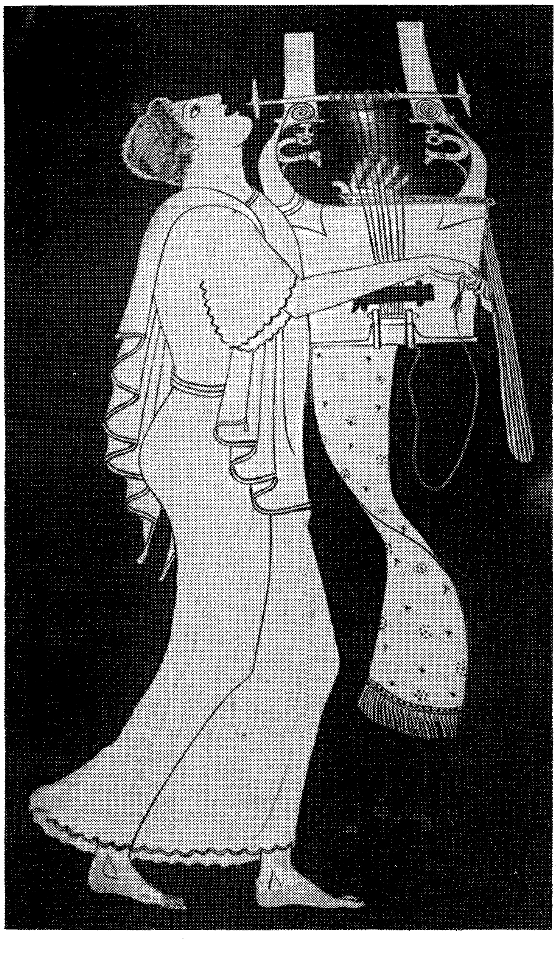
Figure 43.

Perhaps the most famous painting of a kitharode appears on a red-figure amphora by the so-called Berlin Painter.[232] One side of the vase shows a bearded figure with a staff, no doubt intended to represent the judge. The other side shows a young kitharode in full costume, his head thrown back in song. His right hand holds the plectrum, with which he has just completed an outward stroke across the strings. The extended fingers of his left hand fan across the strings in the familiar position. Unlike most paintings of kitharists or kitharodes, this painting conveys a strong sense of energy and movement. The performer's long chiton (χιτών) sways back against the forward motion of his legs. The swaying motion of the performer's body is emphasized by the cloth hanging down behind the kithara, which waves in a curvature matching his left leg. Both the bottom of the chiton and the sleeves are scalloped, while the waist is belted. Over his shoulder, the musician wears a short chlamys (χλαμύς). His upper torso and neck are given substantial development, suggesting a powerful voice, and the kithara itself is drawn in considerable detail (figure 44).

---

[231] London, British Museum, 1926.6–28.7. As another example, one somewhat damaged amphora of about 430 B.C.E., which exhibits an inscription specifying that it was the prize given to a kitharode, shows the kitharode on a small platform facing a seated figure wearing a wreath. A second figure carrying a staff stands behind the performer (reproduced in Maas and Snyder, *Stringed Instruments of Ancient Greece*, 75, figure 10).

[232] New York, Metropolitan Museum of Art, Fletcher Fund, 1956 (56.171.38).



New York, Metropolitan Museum of Art,
Fletcher Fund, 1956 (56.171.38).
All Rights Reserved, The Metropolitan Museum of Art

Figure 44.

The Berlin Painter's kithara shows the relative size and structural design of the instrument quite clearly. The soundbox is rather large in comparison to the soundboxes of the other lyres, and it has a flat bottom. Like those of the phorminx, the arms of the kithara are apparently constructed of two separate parts. Unlike the phorminx, however, the lower arms seem to be mortised into the top of the soundbox rather than rising from it as a natural upward extension. Although the internal construction of the chelys lyre and the kithara are no doubt somewhat different, the ostensible mortising of the lower arms does convey the same impression of arms emerging from someplace within the soundbox. This may have been an intentional illusion, but it is certainly possible that the kithara's lower arms, like the arms of the chelys lyre, did extend down through the soundbox to a point at the bottom where they were joined or braced. As the lower arms rise to the crossbar, they become thinner until joining with the upper arms, which look very much like the upper arms of the phorminx. By contrast with the phorminx, however, the crossbar of the kithara is attached just above the point where the upper and lower arms meet, not at the very top of the instrument. The crossbar itself is rather like that of the chelys lyre, except for the "handles" on either end. Like the other lyres, the kithara normally had seven strings, and in this painting, the kollopes, chordotonon, and bridge are very clearly drawn. Although other paintings of the kithara may differ from the Berlin Painter's instrument in some respects, the details are remarkably consistent.

Typical features of the kithara are the curved ornaments that brace the thinner part of the lower arms, and they regularly appear in almost precisely the form shown by the Berlin Painter. These ornaments may be the angkones (ἀγκῶνες) included in Pollux's list of the parts of stringed instruments. Hesychius states that the angkones are "the things that support the arms of the kithara,"[233] and in the singular, an angkon is a bent arm or an elbow, an image certainly suggested by these braces. It would be tempting to assume that the angkones were made of metal or some other hard substance, but as no known fragments survive, the angkones must have been made of a perishable material. It is altogether possible that each lower arm was made from a single piece of wood carved to produce the characteristic shape and ornament.

---

[233] Hesychius, s.v. ἀγκών: ... καὶ τῆς κιθάρας δὲ τὰ ἀνέχοντα, τοὺς πήχεις, ἀγκῶνες λέγονται. For Pollux's list, see p. 241–42, n. 190 *supra*. Bélis, "Construction de la lyre," 204–5, thinks the term refers in general to the arms of the lyre, but in view of the terminology employed in all the other early descriptions (see pp. 237–43 *supra*), her argument is unpersuasive. Maas and Snyder (*Stringed Instruments of Ancient Greece*, 66) observe that the brace looks somewhat like the eye and open mouth of a bearded snake, noting this as an appropriate image for Apollo's instrument because of his victory over the Python (see chapter 2, pp. 42–43 and 47 *supra*).

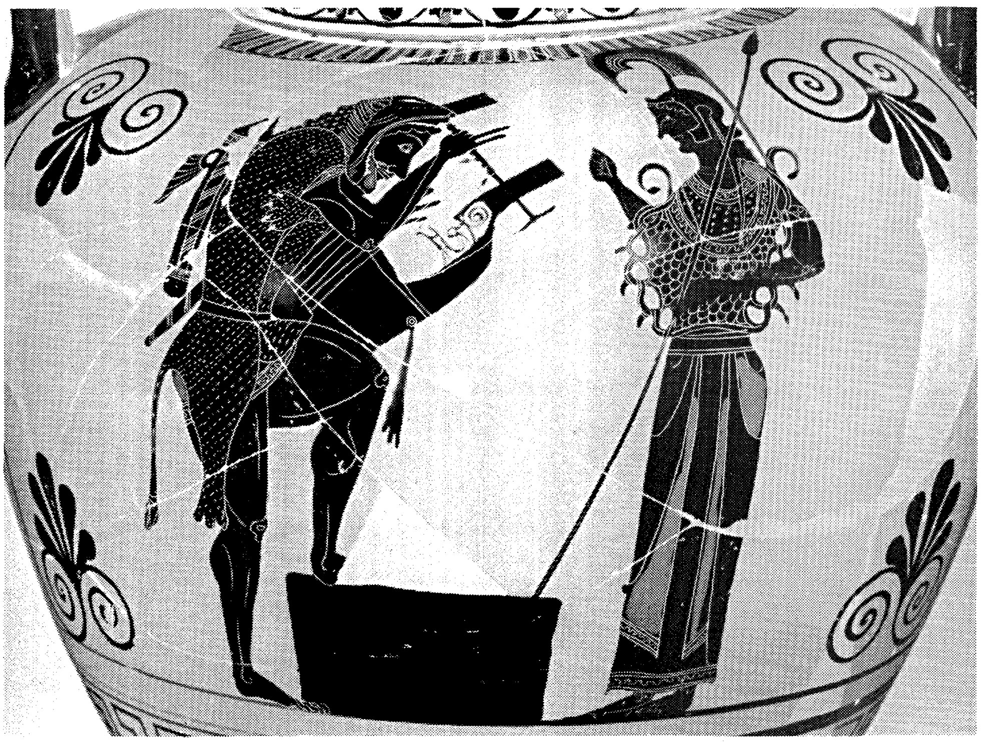
In paintings of the kithara, the crossbar is usually shown in front of the upper arms, just above a spiral or round pattern. This suggests that the crossbar of the kithara, like that of the chelys lyre and barbitos, was seated in a type of notch rather than passing through the upper arms. As the upper arms could well have been hollow, like those of the phorminx, they too might have functioned as secondary resonators, and the spiral patterns may represent soundholes of some sort.[234] Soundholes also seem to have been placed in the soundbox of some instruments on either side of the bridge.

The "handles" that appear on either end of the crossbar in the Berlin Painter's kithara are common even in much earlier paintings of the instrument. The evidence in favor of a fixed crossbar on the other lyres together with the absence of any independent evidence indicating that the entire crossbar of the kithara might have been turned for some purpose or another suggests that these handles were simply decorative. On the other hand, it would have been much easier to string the kithara at a relatively low tuning and tension and then raise all the strings to the desired register by turning the crossbar. The fine tuning of each string could then be adjusted by using the kollopes, as a black-figure amphora depicts Heracles doing just before he mounts the podium to play his kithara (figure 45).[235]

---

[234] See p. 256 *supra*.

[235] Munich, Staatliche Antikensammlungen und Glyptothek, 1575. On Heracles as a kitharist, see Konrad Schauenburg, "Hercules musikos," *Jahrbuch des deutschen archäologischen Instituts* 94 (1979): 49–76. That the kithara may have been strung with a relatively high tension is suggested by Philochorus's description of the innovations of Lysander the kitharist quoted in Athenaeus *Deipnosophistae* 14.42. See p. 271 *infra*.



Staatliche Antikensammlungen und Glyptothek München
Aufnahme: C. H. Krüger-Moessner

Figure 45.

After playing, the performer might then relax the tension on the instrument by turning back the crossbar. It is unlikely but not impossible that the musician could have turned the crossbar in the middle of a performance in order to raise or lower the overall register of the instrument. This would not, however, have preserved the tuning of the instrument. The acoustic properties of strings under tension dictate that the pitch of each string would rise or fall at a different rate when the crossbar was turned, unless —as was surely not the case—all the strings had initially been under equal tension. If the crossbar was manipulated during a performance, it must have been solely to produce one of the special effects attributed to the virtuoso kitharists.[236]

A few side or back views of the kithara are represented in vase painting and sculpture. These suggest that the soundbox had a fairly substantial depth, somewhat greater at the top and tapering towards the bottom. A ridge ran down the center of the back, and the shape of the bottom of the instrument would therefore have been closer to a triangle or semicircle than a rectangle. The top of the soundbox bulged slightly, but this feature is usually obscured by the wrist band.[237] A soundbox of this sort must have been constructed of wood, with the back warped and jointed. As with the other lyres, the arms tilted forward slightly, and like the phorminx, the kithara was certainly decorated with various inlays.

---

[236] See chapter 2, pp. 66–71 *supra.*

The instrument seems to have been held and played in the same general manner as the other lyres, although kithara players almost always stand. Like the other lyres, the kithara is supported, at least in part, by a wrist band attached to the far arm of the instrument. At the point where the end of the wrist band is attached to the arm of the kithara, a decorative sash or long tassel is affixed. Unlike the other lyres, however, the kithara was held upright or tilted slightly back onto the performer's left shoulder, perhaps to give the instrument additional support. The size and probable weight of the instrument make it unlikely that the performer would have been able to support the instrument for any length of time simply by pulling it against his body with the wrist band. In fact, the Berlin Painter's kithara (figure 44) exhibits three lines around the base of the left arm of the kithara, and it is possible that this may represent a shoulder strap attached to this arm, by which the instrument might be suspended from the musician's left shoulder. Thus, most of the weight of the instrument would be supported by the shoulder strap, while the wrist band would enable the performer to hold the instrument in a stable plane. There is no indication of such a shoulder strap in other paintings, but it is common for the far left side of the instrument to be obscured by the performer's body.[238]

---

[237] Martha Maas, "Back Views of the Ancient Greek Kithara," *Journal of Hellenic Studies* 95 (1975): 175 and plate XIXa; and Maas and Snyder, *Stringed Instruments of Ancient Greece,* 65–66. The full side view of the kithara in a painting of Apollo and Artemis on a red-figure hydria in Bern (Bernisches historisches Museum 12409 [reproduced in Maas and Snyder, *Stringed Instruments of Ancient Greece,* 77, figure 16]) is problematic. It shows an extremely deep soundbox with the curved lower arms rotated so that the braces now face forward and the decorative spiral now appears on the side of the upper arm. If this is an accurate side view, then the common front views misrepresent (in the modern sense of the term) the arrangement of the arms, and this misrepresentation could well be presumed for all the lyres. On the other hand, it is also possible that the painter has deliberately superimposed the front view of the arm onto the side view of the soundbox in order to convey the characteristic lower arm and brace, which would, of course, be obscured in a pictorial side view. Such superimposition is common in vase painting of this period. Ancient and non-Western artistic conceptions of accurate pictorial representation and perspective are extremely complex matters that cannot be addressed here (for an introduction, see "Perspective," in *Oxford Companion to Art,* ed. Harold Osborne [Oxford: Oxford University Press, 1970], 840–61, especially 854–56; and John Boardman, "Greek Art and Architecture," in *OHCW,* 275–310). Although some Greek vase painters seem to handle perspective in a very modern manner, this does not mean that all of them were capable of doing so or considered modern perspective an essential artistic technique in all contexts. Viewed in the context of the other front- and back-view paintings and the sculptural representations, which by their very nature as three-dimensional objects are more likely to represent the structural realities of a musical instrument, it seems reasonable to suppose that this particular side view is not pictorially accurate.

The kithara's plectrum was attached to the instrument by its usual cord. The cord itself, however, was normally attached to the bottom of the soundbox rather than to the outer arm of the instrument, as was characteristic of the chelys lyre.

In addition to all its other distinctive features, the kithara generally exhibits a decorated cloth hanging from the back of the instrument (see figure 44). When it is visible, the cloth appears to hang between the performer's left arm and the back of the kithara.[239] Its function is uncertain, but since the kitharist's left forearm would have to lie over the bulging back of the instrument, it may have served the dual function of protecting the back of the instrument from perspiration and the forearm from abrasion.[240]

A special type of kithara appears in a series of vase paintings from the second half of the fifth century B.C.E. illustrating Orpheus, Musaeus, and especially Thamyris in identifiable Thracian scenes. This instrument, which has been called the "Thamyris kithara" or the "Thracian kithara,"[241] has a soundbox in general size like a phorminx but with a flat bottom, concave lower corners, and a rounded top; curved arms—sometimes knurled—with top fittings rather like the barbitos, but much shorter; and a back cloth like the kithara. The association of this kithara with Thamyris in six of the paintings may be explained by the popularity of Sophocles's *Thamyris*, which was produced around 460 B.C.E. As Sophocles himself is said to have played the part of Thamyris, it is even possible that these paintings are intended to represent the composer in scenes from the tragedy (figure 46).[242]

---

[238] The back view illustrated on the red-figure kylix, Cleveland Museum of Art 76.89 (Maas and Snyder, *Stringed Instruments of Ancient Greece*, 77, figure 15), might be expected to show a shoulder strap, but this is not a particularly detailed painting. Maas and Snyder (p. 68) think the three lines on the Berlin Painter's kithara may indicate the point where the decorative cloth that hangs behind the instrument is attached.

[239] The back view of the Cleveland kylix (see n. 238 *supra*) shows the cloth held between the wrist band and the far arm of the instrument, but in view of the other paintings, this is an entirely anomalous location. Once again, it appears that the artist of this cup was not particularly careful about details.

[240] The same general function is served by a cloth some violinists and violists place between the instrument (or the chinrest) and their jaw and upper neck.

[241] Maas and Snyder, *Stringed Instruments of Ancient Greece*, 145.

The precise identification of this instrument as a Thracian kithara is complicated by the fact that it also appears in some scenes not readily identifiable as Thracian: six of these are typical contest scenes with the kitharist surrounded by various judges and Nikes, and one is identified on the vase as "singers at the Panathenaia." This latter scene shows three performers dressed as old satyrs and carrying the Thracian kithara. Specific Thracian associations in these pictures that might have been clear to contemporary viewers are unfortunately no longer apparent.[243]

While the Thracian kithara seems to be a smaller and less complex instrument, a highly elaborate "triple kithara" from about the same period is described by Athenaeus on the authority of Artemon's books on the guild of Dionysus. This kithara, the invention of Pythagoras of Zacynthos,[244] resembled a Delphic tripod (τρίπους) and was accordingly so called. It consisted of three separate sets of strings stretched vertically between the legs of the tripod, which was itself was attached to a revolving base. The base could be turned by the performer's foot, rather like a potter's wheel, in order to bring any set of strings under the performer's hands. The three sets of strings were tuned to the Dorian, Phrygian, and Lydian harmoniai, and their sound was augmented by soundboxes placed in each space just below the basin of the tripod. Furthermore, the overall resonance of the instrument was enlarged by the soundboxes being joined together and to the basin of the tripod by a decoration of some sort. In general technique, the instrument was played like the other lyres: the left hand reached inside the tripod to touch the strings, while the right hand employed the plectrum on the outside. The chief exponent of this instrument was apparently Pythagoras of Zacynthos himself, and after his death, it was largely forgotten. Indeed, Artemon is uncertain whether it ever really existed.[245]

---

[242] Ruvo, Jatta Collection 1538.

[243] For a fuller treatment of the Thracian kithara, together with illustrations, see Maas and Snyder, *Stringed Instruments of Ancient Greece*, 145–47; and Leopold Vorreiter, "Apollon-, Orpheus-, und Thamyris-Lyren." *Archiv für Musikorganologie* 2 (1977): 113–33. The satyr scene is also reproduced in Wegner, *Griechenland*, 65, plate 37.

[244] This is not the famous Pythagoras of Samos but rather the Pythagoras mentioned by Aristoxenus (*Harmonica* [da Rios 46.12]) as one of the earlier musicians who had attempted to enumerate all possible scales. He probably lived in the fifth century B.C.E.

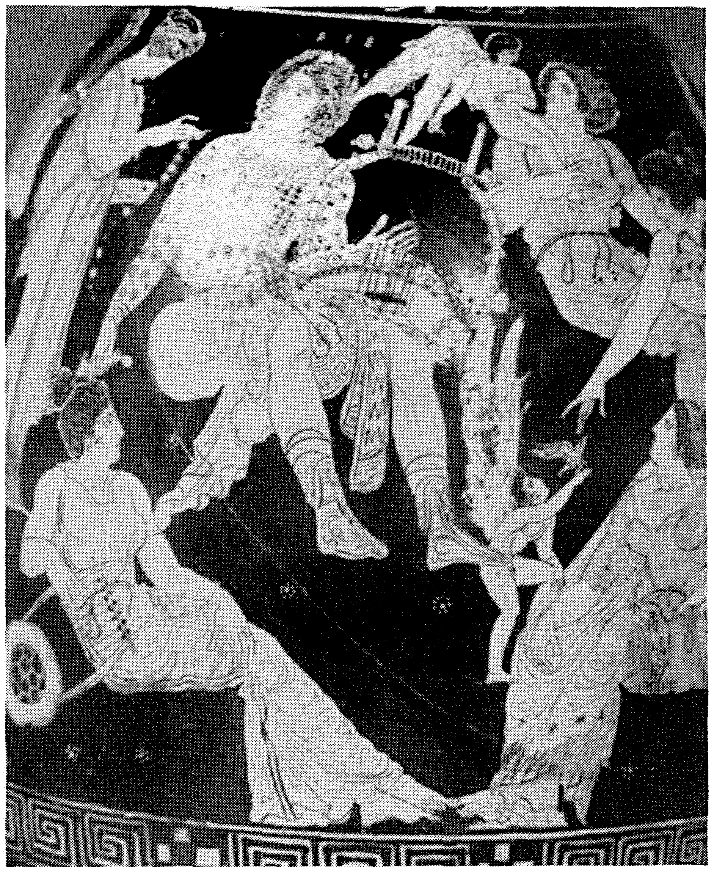

Soprintendenza Archeologica della Puglia–Taranto

Figure 46.

---

[245] Athenaeus *Deipnosophistae* 14.41 (637b–f [Kaibel 3:407–8]). It is remarkable, however, that the concept of the triple kithara returns in the seventeenth century C.E. in the Lyra Barberina of Giovanni Battista Doni. This extraordinary instrument had strings on both sides and could play the Dorian, Phrygian, and Lydian harmoniai. On one side of the instrument, the strings were gut, on the other, bronze. The Lydian harmonia could be played on the gut strings, the Phrygian on the bronze, and the Dorian on either set. Doni's instrument is described in his *Lyra Barberina*, which is also an impressive early iconographic study of Greek lyres in general. Unfortunately, the book was not published in Doni's lifetime, and the Gori-Passeri edition of 1763 does not have the proper

Beginning in the fourth century B.C.E., the iconography of the kithara gradually changes. The instrument appears less detailed and loses its proportions, especially in Italiote paintings. In some representations, it is little more than a box with arms; in others, some detail is present, but the instrument is present in the scene as an incidental decoration or emblem rather than as a central feature. As many of the vases on which these paintings appear were funerary vases, the symbolism of the overall scene was much more important than the individual details. There is therefore no reason to assume that the actual shape and construction of the instrument changed very much as long as it continued to be used, particularly in view of its strong iconic association with Apollo.

Although each of the four lyres—chelys-lyre, barbitos, phorminx, and kithara—exhibits distinctive structural characteristics, they all have a great deal in common, and it is reasonable to suppose that a person able to string, tune, and play one of the lyres could also have played, at least to some degree, any of the others. The important role of musical instruction in paideia—and particularly instruction in playing the chelys lyre—meant that any educated Greek might possess a degree of technical and musical facility that could be employed in any number of social and religious contexts. Likewise, the skill displayed by a kitharode in one of the competitions or in the theatre would be appreciated not just by an audience intellectually versed and prepared to respond as spectators and auditors but also by one that understood the achievement in quite practical terms.[246] Thus, in a very func-

---

illustrations. Claude Palisca's recent edition, however, makes it possible to view Doni's book in something like the intended form. See Claude V. Palisca, *G. B. Doni's* Lyra Barberina: *Commentary and Iconographical Study; Facsimile Edition with Critical Notes,* Miscellanee saggi convegni, vol. 18 (Bologna: Antiquae musicae italicae studiosi, 1981); and idem, "G. B. Doni, Musicological Activist, and His *Lyra Barberina,*" in *Studies in the History of Italian Music and Music Theory* (Oxford: Clarendon, 1994), 467–90 (originally published in *Modern Musical Scholarship,* ed. Edward Olleson [Stocksfield: Oriel Press, 1980], 180–205).

[246] Athenaeus *Deipnosophistae* 4.79 observes: "I do not speak of kitharody alone, about which the most worthless layman among us—even if he is illiterate—is so familiar as to immediately reprove mistakes that arise in playing the instrument" (καὶ οὐ λέγω περὶ κιθαρῳδίαν μόνην, ἧς καὶ ὁ εὐτελέστατος παρ'

tional sense, the lyres served as the common thread that tied together the entire musical culture in a way not matched by any of the other instruments.

Psalteria

The role of the psalteria in Greek musical culture remains somewhat unclear. Although various instruments are mentioned here and there in literary sources, only some of them are represented in iconographic sources—and, at that, only infrequently. The psalteria with a large number of strings may have been associated chiefly with the class of highly skilled musicians and musical scientists that appeared in the sixth century B.C.E., but at least some of them—the sambuke, trigonon, and the Apulian instrument—seem to have been exclusively women's instruments.

Psalterion and epigoneion

Athenaeus, on the authority of Juba, provides one of the few references to the psalterion and the epigoneion:

> The psalterion, as Juba says, was filled out with strings by Alexander of Cythera, and when he was old in the city of Ephesus, he dedicated this invention, as the wisest of his art, to Artemis. Juba also makes mention of the lyrophoenix and the epigoneion, which, though now reshaped into an upright psalterion, retains the appellation of the one who used it. Epigonus was by nature an Ambraciot but by citizenship a Sicyonian. A most musical man, he plucked the instrument by hand without a plectrum.[247]

Pollux agrees in his description of Epigonus and adds that the epigoneion had forty strings, while the simikion had only thirty-five.[248]

The dedication of the psalterion to Artemis, the sister of Apollo and a goddess frequently associated with the wild and uncultivated parts of the earth, implies that these instruments may have been regarded by the Greeks as essentially "folk instru-

---

ἡμῖν ἰδιώτης προσέτι τε καὶ ἀναλφάβητος οὕτως ἐστὶ συνήθης ὡς τάχιστα ἐλέγχειν τὰ παρὰ τὰς κρούσεις ἁμαρτήματα γινόμενα [Kaibel 1:396]).

[247] *Deipnosophistae* 4.81: τὸ δὲ ψαλτήριον, ὥς φησιν Ἰόβας, Ἀλέξανδρος ὁ Κυθήριος συνεπλήρωσε χορδαῖς καὶ ἐγγηράσας τῇ Ἐφεσίων πόλει ὡς σοφώτατον τῆς ἑαυτοῦ τέχνης τουτὶ τὸ εὕρημα ἀνέθηκε ἐν Ἀρτέμιδος, μνημονεύει δ' ὁ Ἰόβας καὶ τοῦ λυροφοίνικος καὶ τοῦ ἐπιγονείου, ὃ νῦν εἰς ψαλτήριον ὄρθιον μετασχηματισθὲν διασῴζει τὴν τοῦ χρησαμένου προσηγορίαν. ἦν δ' ὁ Ἐπίγονος φύσει μὲν Ἀμβρακιώτης, δημοποίητος δὲ Σικυώνιος· μουσικώτατος δ' ὢν κατὰ χεῖρα δίχα πλήκτρου ἔψαλλεν (183c–d [Kaibel 1:400]). Alexander of Cythera is not otherwise known.

[248] *Onomasticon* 4.59. Nothing else is known about the simikion.

ments." On the other hand, Epigonus is mentioned together with Lasus of Hermione by Aristoxenus as a musician whose followers thought that an individual note had breadth,[249] and this suggests an association of these instruments with the early virtuoso performers and musical scientists. Later in the *Deipnosophistae,* Athenaeus adds that the school of Epigonus was noted for playing its instruments in imitation of aulos music, which probably means that the music was complex, dramatic, and expressive. On the authority of Philochorus, Athenaeus remarks that Lysander adopted this style in his own solo kithara music (ψιλοκιθαριστική), known for its colorful shadings and the greater volume of sound produced by the increased tension he applied to the stringing of his kithara.[250]

The term ψιλοκιθαριστική recalls Plato's objection to ψιλὴ κιθάρισις in his discussion of artistic imitation and representation—or, *mimesis*—in the second book of the *Leges.* Plato rejected the emphasis on virtuosity that formed an inescapable part of solo instrumental music, but his deeper concern was the absence of text in this type of music. For Plato, text was essential in music if it was to be capable of mimesis. Music, of course, presents special difficulties for mimetic theory in any age,[251] and Plato makes it clear that when he speaks of musical mimesis, he does not mean the mere imitation of sounds:

---

[249] *Harmonica* (da Rios 7.19–21); the association of Epigonus with Lasus of Hermione suggests a date sometime in the sixth century B.C.E. On Lasus of Hermione, see chapter 2, pp. 74–76 *supra.*

[250] *Deipnosophistae* 14.42: τὴν δὲ ψιλὴν κιθάρισιν πρῶτόν φησιν Μέναιχμος εἰσαγαγεῖν Ἀριστόνικον τὸν Ἀργεῖον, τῇ ἡλικίᾳ γενόμενον κατὰ Ἀρχίλοχον, κατοικήσαντα ἐν Κορκύρᾳ. Φιλόχορος δ' ἐν γ' Ἀτθίδος "Λύσανδρος, φησίν, ὁ Σικυώνιος κιθαριστὴς πρῶτος μετέστησε τὴν ψιλοκιθαριστικήν, μακροὺς τοὺς τόνους ἐντείνας καὶ τὴν φωνὴν εὔογκον ποιήσας, καὶ τὴν ἔναυλον κιθάρισιν, ᾗ πρῶτοι οἱ περὶ Ἐπίγονον ἐχρήσαντο. καὶ περιελὼν τὴν σοντομίαν τὴν ὑπάρχουσαν ἐν τοῖς ψιλοῖς κιθαρισταῖς χρώματά τε εὔχροα πρῶτος ἐκιθάρισε καὶ ἰάμβους καὶ μάγαδιν, τὸν καλούμενον συριγμόν, καὶ ὄργανον μετέλαβεν μόνος τῶν πρὸ αὐτοῦ, καὶ τὸ πρᾶγμα αὐξήσας χορὸν περιεστήσατο πρῶτος" (637f–638a [Kaibel 3:408]). The interpretation of the phrase ἔναυλος κιθάρισις is open to some question; it may mean that Lysander (fl. sixth century B.C.E.) played the kithara in imitation of aulos music or that the kithara was accompanied by the aulos. The passage is discussed in Andrew Barker, "Innovations of Lysander the Kitharist," *Classical Quarterly* n.s. 32 (1982): 266–69. On the ψιλοκιθαριστική, see Annie Bélis, "Les terms grecs et latins désignant des spécialités musicales," *Revue de philologie, de littérature et d'histoire anciennes* 62 (1988): 242–44.

[251] See chapter 2, pp. 59, 68–69, 76–77, 89–90, and 99 *supra.*

> For they behold all these things jumbled together, and how, also, the poets separate rhythm and the forms from the melos. They set bare texts into meters or, on the other hand, melos and rhythm without words, and they use solo kithara and aulos music, in which it is altogether difficult without a text to understand what rhythm and harmonia is intended and which of the noteworthy models it is like. But it is necessary to realize that such a thing is altogether full of great boorishness. Because they are exceedingly fond of speed, accuracy, and beastly sounds, they use aulos and kithara music without dance and song. Anyone who would make use of either of these instruments solo is altogether unmusical and a conjurer.[252]

Plato's rather vigorous rebuke of solo instrumental music may suggest that this was a new innovation, but in fact, solo kithara playing was added to the Pythian games in 558 B.C.E.[253] Solo instrumental music remained popular, Plato's opinion of its mimetic impotence notwithstanding. If the style of solo kithara music did indeed emerge from the music of the epigoneion, the historical importance of this instrument would be considerably greater than the limited literary and iconographic record would suggest.

Magadis, pektis, and phoenix

Though the magadis is the subject of more extended comment in Athenaeus's *Deipnosophistae*, the precise definition of this instrument was already unclear in his day. In Book XIV, Athenaeus begins by raising the question whether the magadis is an aulos or a type of kithara. Some writers, he observes, clearly describe it as a stringed instrument, while others seem to use the term in association with the aulos. On the authority of Didymus, Athenaeus decides that the magadis was originally a plucked instrument, as Anacreon describes it:

---

[252] ταῦτά τε γὰρ ὁρῶσι πάντα κυκώμενα καὶ εἴ τι διασπῶσιν οἱ ποιηταὶ ῥυθμὸν μὲν καὶ σχήματα μέλους χωρίς, λόγους ψιλοὺς εἰς μέτρα τιθέντες, μέλος δ' αὖ καὶ ῥυθμὸν ἄνευ ῥημάτων, ψιλῇ κιθαρίσει τε καὶ αὐλήσει προσχρώμενοι, ἐν οἷς δὴ παγχάλεπον ἄνευ λόγου γιγνόμενον ῥυθμόν τε καὶ ἁρμονίαν γιγνώσκειν ὅ τί τε βούλεται καὶ ὅτῳ ἔοικε τῶν ἀξιολόγων μιμημάτων. ἀλλ' ὑπολαβεῖν ἀναγκαῖον ὅτι τὸ τοιοῦτόν γε πολλῆς ἀγροικίας μεστὸν πᾶν, ὁπόσον τάχους τε καὶ ἀπταισίας καὶ φωνῆς θηριώδους σφόδρα φίλον, ὥστ' αὐλήσει γε χρῆσθαι καὶ κιθαρίσει πλὴν ὅσον ὑπὸ ὄρχησίν τε καὶ ᾠδήν· ψιλῷ δ' ἑκατέρῳ πᾶσά τις ἀμουσία καὶ θαυματουργία γίγνοιτ' ἂν τῆς χρήσεως (669d–670a).

[253] See Pausanias 10.7.7 and chapter 2, p. 59 *supra*.

> I pluck on twenty strings as I hold the magadis, O Leucapsis, while you are in the flower of youth.[254]

Turning to other authorities, Athenaeus observes that the magadis may be equated with the pektis and perhaps also the sambuke. On the other hand, he also adduces authorities who differentiate between the magadis and the pektis. From the welter of conflicting views, one important characteristic emerges: the magadis was associated with antiphonal sounds of low and high pitch. That the antiphonal pitches were normally octaves is suggested by a fragment of Theophilus's comedy *Neoptolemus* quoted by Athenaeus:

> It is bad for a boy and his father and mother lying on a wheel to magadize, for no one of them will sing the same melos.[255]

As it happens, the verb used in this passage, *magadize* (μαγαδίζειν), also appears in the Aristotelian *Problemata* 19.18 and 39, where it is clearly defined as singing in octaves and, in particular, the natural octaves produced by men and boys singing together. The sense of Theophilus's irony must therefore be that stories extracted under torture will hardly be consonant.

If a particular characteristic of the magadis—and perhaps also the pektis—was the simultaneous sounding of octaves, it is quite possible that its strings were tuned in pairs, an arrangement that would also have produced additional sympathetic resonance in the instrument. When applied to the aulos by several of Athenaeus's authorities, the term may well reflect the similarity between paired strings and the paired pipes of the aulos, particularly if the two pipes were tuned to play in octaves.[256]

---

[254] *Deipnosophistae* 14.35: ψάλλω δ' εἴκοσι ... | χορδαῖσι μάγαδιν ἔχων· ὦ Λεύκασπι, σὺ δ' ἡβᾷς (634c [Kaibel 3:399]).

[255] *Deipnosophistae* 14.36: πονηρὸν υἱὸν καὶ πατέρα καὶ μητέρα | ἐστὶν μαγαδίζειν ἐπὶ τροχοῦ καθημένους· | οὐδείς γὰρ ἡμῶν ταὐτὸν ᾄσεται μέλος (635a [Kaibel 3:401]). Theophilus flourished ca. 329 B.C.E.

[256] Athenaeus *Deipnosophistae* 4.80 (182d), 4.81 (183b–c), and 14.35 (634d–e). Athenaeus quotes a short passage by the parodist Sopater, in which he refers to the "two-stringed pektis": πηκτὶς δὲ Μούσῃ γαυριῶσα βαρβάρῳ | δίχορδος εἰς σὴν χεῖρά πως κατεστάθη (183b–c [Kaibel 1:399]). As the instrument is regularly noted as one of the psalteria with many strings, it is reasonable to assume that Sopater is referring to the paired arrangement of strings rather than the total number of strings on the instrument.

The antiphonal role of the magadis and the distinction between the magadis and the pektis appear clearly in a passage quoted by Athenaeus from the work of Diogenes of Oinomaos:

> I hear that Lydian and Bactrian maidens living by the river Halys worship the Tmolian goddess Artemis in a laurel-shaded grove, striking the magadis with motions balancing the playing of the trigona and the pektides, while in a Persian nomos, the welcome aulos agrees with the choruses.[257]

This passage also conveys the strong association of the pektis, magadis, and trigonon with women, and in fact, it became traditional to ascribe the invention or first use of the pektis to Sappho. Herodotus, however, asserts that the Lydian troops marched to the accompaniment of the syrinx, pektis, and aulos, while a fragment of one of Pindar's encomia describes Terpander hearing the pektis playing together with the barbitos at the banquets of the Lydians.[258]

The magadis, on the other hand, was attributed both to the Lydians and the Thracians. Athenaeus states that Anacreon considered the instrument a Lydian invention, but elsewhere he refers to other authorities who give it and a related instrument, the phoenix, Thracian associations. Athenaeus quotes a short passage from Sophocles's *Thamyris* that describes the magadis and the lyre as sweet-toned instruments made of carved wood, and he also explains that the phoenix, which was used by the Thracian kings at their banquets, derived its name either from its Phoenician origin or because its arms were made of phoenix wood (i.e., the date-palm tree).[259]

The absence of any unmistakable iconographic representation of these instruments suggests that they were either supplanted by other psalteria after the sixth century B.C.E. or were simply not of sufficient iconic significance to be represented. On the other hand, all these names may apply to only a single basic instrument, perhaps with certain variations in stringing and tuning.[260]

---

[257] *Deipnosophistae* 14.38: κλύω δὲ Λυδὰς Βακτρίας τε παρθένους | ποταμῷ παροίκους Ἄλυι Τμωλίαν θεὸν | δαφνόσκιον κατ' ἄλσος Ἄρτεμιν σέβειν | ψαλμοῖς τριγώνων πηκτίδων ἀντιζύγοις | ὁλκοῖς κρεκούσας μάγαδιν, ἔνθα Περσικῷ | νόμῳ ξενωθεὶς αὐλὸς ὁμονοεῖ χοροῖς (636a–b [Kaibel 3:403–4]). Diogenes lived ca. 400–ca. 325 B.C.E.

[258] For Sappho, see Athenaeus *Deipnosophistae* 14.37 (635b and e), on the authority of Menaechmus of Sicyon. Cf. Herodotus *Historiae* 1.17; Pindar *Encomia* fr. 125 + 126 (see n. 210 *supra*). Herodotus could, however, be using the term to refer to a wind instrument. Hesychius (s.vv.) links pektides and syrinxes and indicates that the pektis can be a pandourion, a psalterion, or a syrinx.

[259] Cf. Athenaeus *Deipnosophistae* 14.36 (634f) and 14.40 (636f–637b), on the authority of Douris, Nicomedes, Scamon, and Semus. Pollux *Onomasticon* 4.61 considered the magadis an invention of the Thracians. On the phoenix, cf. Herodotus *Historiae* 4.192.

Trigonon and sambuke

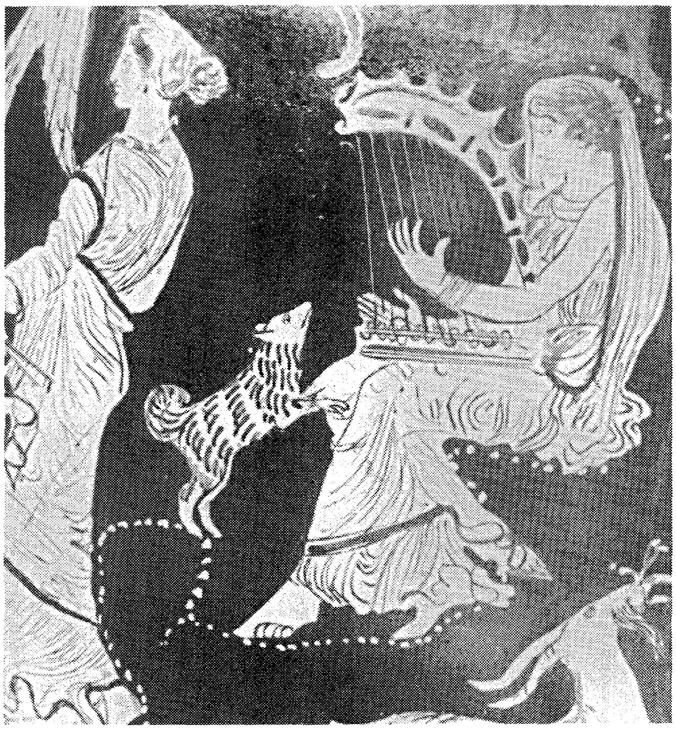
Unlike the other psalteria, the trigonon—a "triangular" psalterion, as its name states—is represented with some frequency in vase painting, with at least three varieties of the basic instrument. Most of them, however, sit on the performer's lap or on a platform next to the performer, all are fairly large instruments that reach as high or somewhat higher than the top of the performer's head, and all have a separate soundbox. In each case, the trigonon rests on its arm, not on the soundbox.

Two of the varieties of trigona are closed triangles, that is, the soundbox forms one side, the arm to which the strings are attached forms the bottom, and a post running more or less parallel to the strings forms a third side and probably braces the instrument against the tension of the strings. The third variety omits the strengthening post and forms an open triangle. In this instrument, the soundbox arches and broadens somewhat as it rises from the base arm; thus, the longer strings are attached to the broader part of the soundbox.

All the representations of the open trigonon show the instrument with the longest strings most distant from the performer, who is in every case a female figure—either a Muse or a mortal woman. Figure 29 (see p. 213) provides a typical representation of the open trigonon, together with the aulos and the chelys lyre. In this illustration, the painter has also indicated string fasteners along the soundbox and on the base arm. A red-figure pelike in Naples (figure 47) suggests that the strings were attached to the base arm with kollopes, and the instrument would therefore have been tuned at the bottom. This instrument, however, seems to have a second parallel base arm on which it rests, thereby elevating the kollopes from the performer's lap. The second arm is not present in every painting, and the point at which the strings were tuned may have varied from instrument to instrument.[261]

---

[260] It is important to keep in mind that absolute generic purity is a modern aesthetic concept. Especially in the case of musical instruments, it has always been common for a variety of local, national, or colloquial names to be applied to the same basic instrument. Many of the names applied to the Greek instruments reflect various regional or national origins, usually not Greek (see n. 176 *supra*). For a modern parallel, one has only to think of names such as klavier, clavichord, clavecin, clavicembalo, spinet, virginal, and harpsichord as terms that have been applied in varied ways, both to instruments that may look (or be) quite similar and to instruments quite different in appearance and mechanism. For a full review of the evidence on the magadis, see Maas and Snyder, *Stringed Instruments of Ancient Greece*, 40–41 and 147–50. For a skeptical view, see Andrew Barker, "Che cos'era la «mágadis»?" in *La musica in Grecia*, ed. Bruno Gentili and Roberto Pretagostini, Storia e società (Roma-Bari: Laterza, 1988), 96–107.



Laboratorio fotografico della Soprintendenza Archeologica delle Province di Napoli e Caserta

Figure 47.

The dark ovals along the soundbox of the instrument in figure 47 may indicate that some instruments had soundholes, but it is also possible that the ovals—like the spikes along the back of the soundbox—are merely a decoration.

Athenaeus states on the authority of Juba that the trigonon was the invention of the Syrians, adds that another authority, Neanthes of Cyzicus, attributes its invention to Ibycus of Rhegium, and quotes a passage from Sophocles's *Mysians* that refers to a "Phrygian trigonos." Aristoxenus too regarded the trigonon as one of the "foreign" instruments.[262] Representations of similar instruments in Babylonian, Assyrian, Cypriot, and Egyptian art strengthen its association with Asia Minor rather than Rhegium on the southern tip of the Italian peninsula.

---

[261] Naples, Museo nazionale 81392. A number of the harps in Apulian vase paintings also show this second arm (see Maas and Snyder, *Stringed Instruments of Ancient Greece,* 195, figure 13; 196, figure 15; and 197, figure 17).

Of the two varieties of closed trigona, one is essentially like the open trigonon but with a post running parallel to the strings from the tip of the base arm to the tip of the soundbox. Once again, all the performers shown with this instrument are female figures. In at least one case, however, the Muse stands while playing the instrument, a departure from the usual seated position.[263]

Representations of the other closed trigonon are largely limited to the fifth century B.C.E., and four of them have been attributed to a single painter, the so-called Washing Painter. At least one distinctive characteristic emerges in all the vase paintings: the soundbox is shaped like a spindle, broadest at the center and narrower at each end. In addition, most representations show the soundbox forming the outer side of the triangle, away from the performer's body. Thus, the longer strings are closer to the performer, exactly opposite to the arrangement of the open trigonon. In one remarkable illustration of the instrument, the strings are longest in the center of the instrument and become shorter as they move to the two points of the triangle (figure 48).[264] While this arrangement may seem anomalous, it does place the longest strings resonating against the largest part of the spindle-shaped soundbox and the shorter strings proportionately against the smaller part of the soundbox.[265]

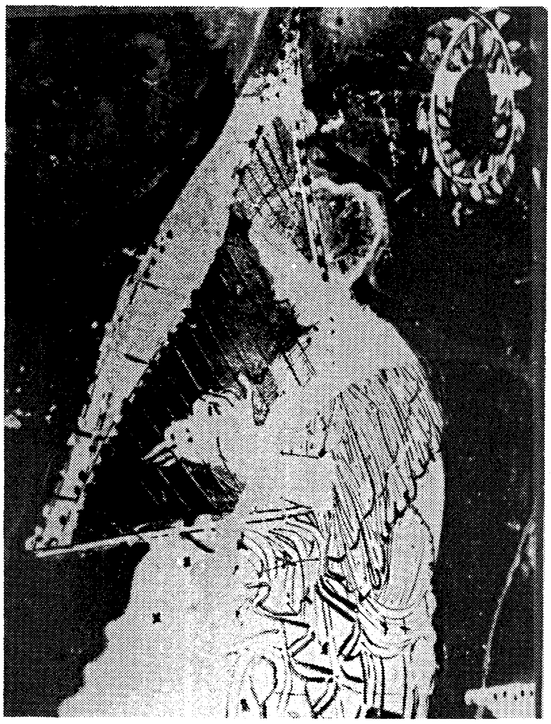
---

[262] Athenaeus *Deipnosophistae* 4.77 (175d–e), 4.82 (183e [the same passage is quoted again at 14.36 (635c)]), 4.80 (182f). For Juba, cf. p. 270 *supra* and for Phrygia and Rhegium, see maps 1 and 2 (pp. 20–21).

[263] Berlin, Staatliche Museen Preussischer Kulturbesitz 2391 (see Maas and Snyder, *Stringed Instruments of Ancient Greece*, 163, figure 15). In one painting of a closed trigonon, together with a pair of auloi and a small lyre, the post is in the form of a standing swan (see Wegner, *Griechenland*, 111, plate 70).

[264] Red-figure pyxis by the Washing Painter, preserved in Würzburg, Martin von Wagner-Museum der Universität Würzburg, H 4455 (L. 541).

[265] The various "harps" are discussed in Maas and Snyder, *Stringed Instruments of Ancient Greece*, 1–2, 150–54, 166, and 181–85. See also Sachs, *History of Music Instruments*, 135–38; and for an additional illustration of this particular version of the closed trigonon, see Wegner, *Griechenland*, 103, plate 65.



Martin von Wagner Museum, Universität Würzburg
Photo: K. Oehrlein

Figure 48.

If a characteristic of the magadis and pektis was indeed the presence of paired strings in octaves, the instrument depicted in figure 48 could well fit the description. Moreover, it is certainly possible that the same basic instrument could have been strung in a variety of ways. If this was the practice, it offers yet another reason why the literary sources would be uncertain in their application of terms to various instruments and the visual artists would differ in their representations in subtle but reasonable ways.

The number of strings shown in representations of trigona varies from perhaps nine to thirty-two. The instruments certainly suit their general appellation as "many stringed," and it is possible that in the various condemnations of the new style that appear so often in the literary sources, the trigonon or any of the psalteria were the instruments intended, not the lyres.[266]

---

[266] One of the most difficult of the sources that seems to refer to a lyre of eleven strings is the fragment by Ion of Chios. For various interpretations of this passage, see Flora R. Levin, "The Hendecachord of Ion of Chios." *Transactions of the American Philological Association* 92 (1961): 295–307; and Martha Maas, "*Polychordia* and the Fourth-Century Greek Lyre," *Journal of Musicology* 10 (1992): 74–88; and Maas and Snyder, *Stringed Instruments of Ancient Greece,* 154–55.

The sambuke is frequently associated with the trigonon and magadis in the literary sources, but its distinctive features remain uncertain. Athenaeus provides a variety of descriptions:

> After this, when there arose an inquiry about the sambuke, Massourios said that the sambuke is a high-pitched musical instrument and Euphorion the epic poet talked about it in his book on the Isthmian games. He said that the Parthians and the Troglodytes use it and that it has four strings (and that Pythagoras asserts this in his book on the Red Sea). One of the types of siege instrument is also called "sambuke," the form and construction of which Biton demonstrates in his book for Attalus on instruments. Andreas of Panormus, in the thirty-third book of his work on the cities of Sicily, says that it is brought up against the enemy's walls by two ships and is called "sambuke" because when it is raised, it takes on the form of a ship and a ladder, and the form of the sambuke is also like this. Moschos, in the first book of his mechanics, says that it was a Roman mechanism and Heraclides of Tarentum invented its shape. Polybius in the eighth book of his *Historiae* says: "Marcellus, baffled at the siege of Syracuse by the machinery of Archimedes, said that Archimedes had ladled from the sea with his ships and that the sambukai, slapped as if a drunk, were banished in disgrace."[267]

Athenaeus later adds that "sambuke" is merely a modern name for the magadis, according to Euphorion, while according to Phillis of Delos, it is distinct from the magadis. Semus of Delos, the authority who offered an explanation for the name of the phoenix, remarks that the sambuke was named after its inventor, Sambyx.[268]

---

[267] Athenaeus *Deipnosophistae* 14.34: μετὰ δὲ ταῦτα ζητήσεως γενομένης περὶ σαμβύκης ἔφη ὁ Μασσούριος ὀξύφθογγον εἶναι μουσικὸν ὄργανον τὴν σαμβύκην διειλέχθαι τε περὶ αὐτοῦ Εὐφορίωνα τὸν ἐποποιὸν ἐν τῷ περὶ Ἰσθμίων χρῆσθαι φήσας αὐτῷ Πάρθους καὶ Τρωγλοδύτας τετραχόρδῳ ὄντι· ἱστορεῖν δὲ τοῦτο Πυθαγόραν ἐν τῷ περὶ τῆς Ἐρυθρᾶς Θαλάσσης. καλεῖται δέ τι καὶ τῶν πολιορκητικῶν ὀργάνων σαμβύκη, οὗ τό τε σχῆμα καὶ τὴν κατασκευὴν ἀποδείκνυσι Βίτων ἐν τῷ πρὸς Ἄτταλον περὶ Ὀργάνων. καὶ Ἀνδρέας ὁ Πανορμίτης ἐν τῷ τριακοστῷ τρίτῳ τῶν Σικελικῶν τῶν κατὰ πόλιν, ὡς ἀπὸ δύο νεῶν προσάγοιτο τοῖς τῶν ἐναντίων τείχεσι· καλεῖσθαί τε σαμβύκην, ἐπειδὴ ὅταν ἐξαρθῇ γίνεται σχῆμα νεὼς καὶ κλίμακος ἑνοποιουμένων, ὅμοιον δέ τί ἐστιν καὶ τὸ τῆς σαμβύκης. Μόσχος δ' ἐν πρώτῳ Μηχανικῶν Ῥωμαικὸν εἶναι λέγει τὸ μηχάνημα καὶ Ἡρακλείδην τὸν Ταραντῖνον εὑρεῖν αὐτοῦ τὸ εἶδος. Πολύβιος δ' ἐν τῇ ὀγδόῃ τῶν Ἱστοριῶν "Μάρκελλος, φησί, δυσχρηστούμενος ἐν τῇ Συρακουσῶν πολιορκίᾳ ὑπὸ τῶν Ἀρχιμήδους κατασκευασμάτων ἔλεγεν ταῖς μὲν ναυσὶν αὐτοῦ κυαθίζειν ἐκ θαλάσσης Ἀρχιμήδην, τὰς δὲ σαμβύκας ῥαπιζομένας ὥσπερ ἐκ πότου μετ' αἰσχύνης ἐκπεπτωκέναι" (633f–634b [Kaibel 3:398–99]).

[268] Cf. Athenaeus *Deipnosophistae* 14.36 (635a), 14.38 (636b), and 14.40 (637b). On the phoenix, see p. 274 *supra*.

The literary emphasis on the similarity in appearance between the sambuke and a ship taken together with the appearance of the soundbox of one of the closed trigona, which in shape resembles a hull as much or more than a spindle (see figure 48), suggests that this particular form of the trigonon might be the sambuke.[269]

Like the trigonon, the sambuke was strongly associated with women. Aristides Quintilianus agrees with Athenaeus's authority Massourios in calling it a high-pitched instrument "because of the smallness of its strings" and adds that the instrument has a faint sound.[270] This delicacy of sound would have well suited the sambuke for music-making in the private chambers of the Muses or mortal women, the common context for the trigona in vase paintings.

The Apulian instrument

A device resembling nothing so much as a small ladder appears in several hundred Apulian vase paintings together with other musical instruments.[271] Most of these are women's scenes, and as they typically include such visual attributes of Aphrodite as erotes, balls, mirrors, birds, and so on, it is possible that the instrument itself is emblematic of the goddess.

In many of the scenes, the instrument, which has not been associated with any known Greek name, simply rests on the floor or hangs on the wall, but in some, it is held by one of its sides. In scenes that represent the traditional funerary temple or shrine surrounded by figures, it appears both inside and outside the tomb. Thus, it would seem to have some symbolism for both the present life and the afterlife.

---

[269] Sachs, *History of Musical Instruments*, 83–84, relates the sambuke to the Babylonian *sabka*, which also designates a siege machine, and concludes that the appearance of the soundbox of the trigonon together with the ladder-like arrangement of the strings would fit the description of the instrument as like a boat with an upright ladder. For a fuller examination of all the evidence, see J. G. Landels, "Ship-shape and *Sambuca*-fashion," *Journal of Hellenic Studies* 86 (1966): 69–77.

[270] *De musica* 2.16: τὴν δὲ σαμβύκην πρὸς θηλύτητα, ἀγεννῆ τε οὖσαν καὶ μετὰ πολλῆς ὀξύτητος διὰ τὴν μικρότητα τῶν χορδῶν εἰς ἔκλυσιν περιάγουσαν (W.-I. 85.10–12).

[271] Beginning in the fourth century B.C.E., major centers of ceramics and vase painting established themselves on the Italian peninsula and began making large and expensive wares. The most distinctive of these painted vases come from Apulia, but there were also centers at Lucania, Campania, and Sicily. The "ladder" also appears on sacred disks from Tarentum and Brundisium in Calabria (see map 2, p. 21).

The number of "rungs" on the ladder ranges between six and twenty, and in some paintings, a small dot appears in the center of each "rung." A number of modern scholars hypothesized that the instrument might be the seistron, Archytas's rattle, or some other type of percussion instrument, perhaps even a xylophone.[272]

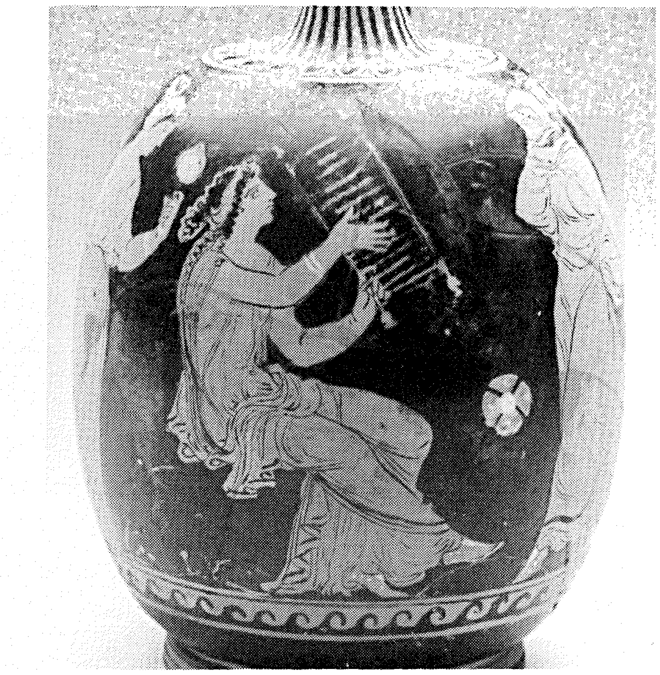


Figure 49.

A single painting recently recognized on an Apulian lekythos (figure 49),[273] however, shows the instrument actually being played. The performer's left hand holds it aloft by the bottom of one of its sides, while the right hand appears to pluck some of the rungs—or, more properly it would seem, strings or bars.[274] The performance technique exhibited in this illustration is not altogether incompatible with a percussion instrument, but the curvature of the fingers certainly suggests that the strings or bars—constructed of whatever material—are being plucked rather than struck. If the cross lines are intended to represent strings, the top and bottom cross pieces must have been made of wood or metal in order to support the tension of the strings. On the other hand, all the cross pieces could be metal; in this case, the instrument could have been struck or plucked and might have produced a sound rather like that of a glockenspiel. If the cross pieces were wood, as is required by the hypothesis that the instrument was some sort of xylophone, it is unlikely they would ever have been sounded by plucking.[275]

---

[272] See H. W. R. Smith, *Funerary Symbolism in Apulian Vase-Painting,* ed. J. K. Anderson, University of California Publications, Classical Studies, vol. 12 (Berkeley: University of California Press, 1976), 129–32; Wegner, *Musikleben der Griechen,* 66–67 and 229; idem, *Griechenland,* 110, plate 69; and Eva Keuls, "The Apulian 'Xylophone': A Mysterious Musical Instrument Identified," *American Journal of Archaeology* 83 (1979): 476–77. For an illustration showing a "bump" on each "rung," see Wegner, *Griechenland,* 111, plate 69.

[273] Essen, Ruhrlandmuseum, Inv. 74.158 A 3.

The instrument also appears in at least thirty Gnathia vase paintings, but it is never played by anyone in these scenes. In fact, it most often appears alone or framed simply by a light decoration, although it does appear together with auloi in two instances. Gnathia vases are, however, much smaller than other Apulian vessels, and they simply do not lend themselves to complex scenes.[276]

The iconographic symbolism of the Apulian musical instrument is obviously more important than any musical role it may actually be playing in the various scenes. Its place in the musical culture of the Greeks remains obscure.

---

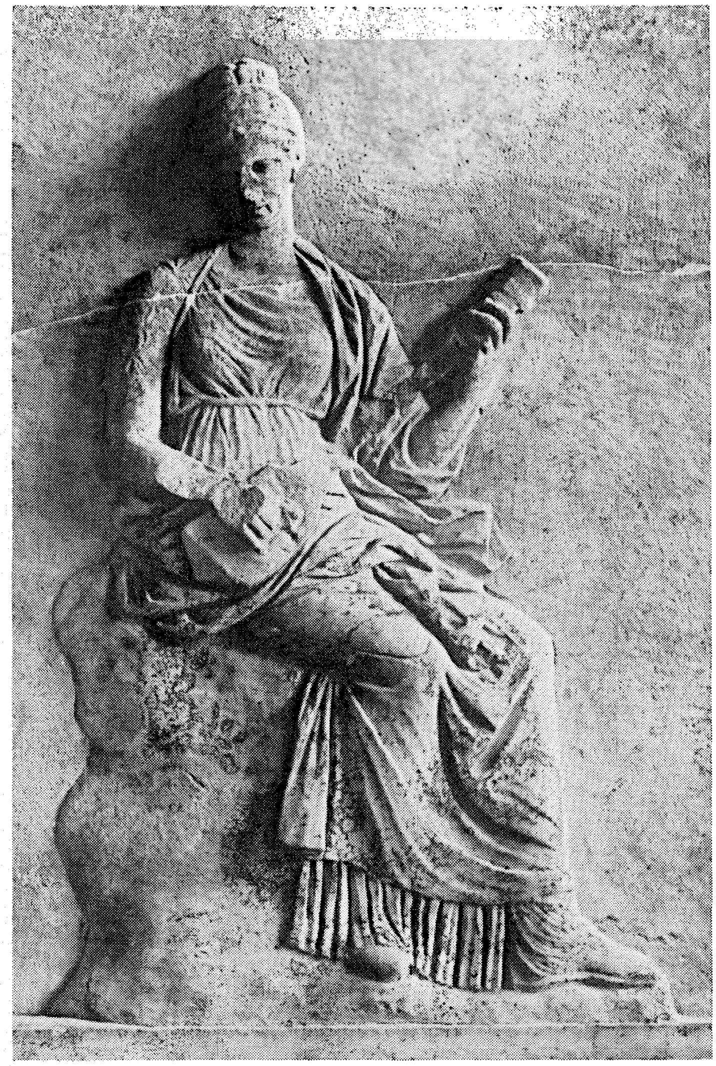
[274] See A. D. Trendall and A. Cambitoglou, *The Red-Figured Vases of Apulia*, 2 vols., Oxford Monographs on Classical Archaeology (Oxford: Clarendon, 1978), 1:315–17; G. Schneider-Herrmann, "Die 'kleine Leiter': Addenda zum Xylophon auf italischen Vasen," *BABESCH: Bulletin antike Beschaving* 52–53 (1977–78): 265–67 and 277–78.

[275] Schneider-Herrmann ("'kleine Leiter,'" 265–66 and figure 7) also reports on an eighth-century metal instrument found in a Calabrian grave together with other apparent musical instruments. The shape of the instrument is rather like the ladder shape in the Apulian vase paintings. This instrument, however, is only 10–15 cm in length, while the instrument in the vase paintings is generally at least as long as the performer's torso.

[276] Jane Gray Nelson, "'Xylophones' on Gnathia Vases," *BABESCH: Bulletin antike Beschaving* 61 (1986): 30–33.

The pandoura and skindapsos

A limited amount of iconographic and literary evidence supports the presence of an instrument in ancient Greece resembling a lute. The famous pedestal sculpted in the mid-fourth century B.C.E. for a Mantineian temple in honor of Leto and her children included representations of the six Muses, each holding a characteristic device. One of the Muses holds an instrument with a small soundbox and a long neck against which she clearly stops the strings with her left hand, while her right hand strums the instrument over the soundbox. The soundbox has sloping shoulders, and its base exhibits the same triangular shape seen in some relief representations of the kithara's soundbox. The neck, which



Alinari/Art Resource, NY

Figure 50.

is almost twice as long as the soundbox and distinct from it, shows indications of tuning pegs at the top (figure 50).[277] By contrast, a terracotta statuette of a female figure—perhaps a Muse—dating from the fourth century B.C.E. now preserved in the Louvre shows a small pear-shaped instrument with a somewhat shorter neck growing directly out of the soundbox without obvious demarcation.[278]

Each of these two types appears in several representations, but it is remarkable that all of them are figurines or reliefs.[279] Most of them date from the period around 330 B.C.E., that is, the time of Alexander the Great's Persian campaigns, and it is quite possible the instruments were derived from this region.

Athenaeus simply mentions the pandoura in a number of places, although he does note on the authority of a certain Pythagoras that it was constructed from the mangrove that grows in the sea. Pollux adds that the pandoura was invented by the Assyrians and was a three-stringed (τρίχορδον) instrument.[280] Athenaeus also mentions a four-stringed instrument called a skindapsos (σκινδαψός), which may have been a larger version of the same instrument. While it may seem odd that this instrument had so few strings when all the other lyres and psalteria had so many, the instrument's simplicity in construction may have been part of its appeal. An instrument with a fretted neck could easily produce with greater accuracy far more pitches on three strings than any of the multi-stringed instruments. Moreover, because it had only three strings, it would be easier to tune, and its overall tuning would be more stable.

---

[277] Athens, National Museum 216. On the Mantineian pedestal, which also exhibits the famous contest between Apollo and Marsyas, see p. 181 *supra*. On the shape of the kithara's soundbox, see pp. 264–65 *supra*.

[278] Paris, Louvre CA574. For an illustration, see Riethmüller and Zaminer, *Musik des Altertums*, 211.

[279] The fullest study is R. A. Higgins and R. P. Winnington-Ingram, "Lute Players in Greek Art," *Journal of Hellenic Studies* 85 (1965): 62–71; but see also Théodore Reinach, "La guitare dans l'art grec." *Revue des études grecques* 8 (1895): 371–78. A summary appears in Maas and Snyder, *Stringed Instruments of Ancient Greece*, 185–86.

[280] On the pandoura, see Athenaeus *Deipnosophistae* 4.78 (176b), 4.80 (182e), and 4.82 (183f–184a); and Pollux *Onomasticon* 4.60. Athenaeus's authority is neither the famous Pythagoras of Samos nor the Pythagoras of Zacynthos associated with the tripod kithara (see pp. 267–68 *supra*), but rather the Pythagoras who wrote about the Red Sea (see p. 279 *supra*). On the skindapsos, see Athenaeus *Deipnosophistae* 4.81 (183a–b). Pollux *Onomasticon* 4.59 includes the instrument in a list but says nothing about it.

The rich array of musical instruments employed in Greek culture—whether indigenous or borrowed from other cultures—attests to the importance of varied colors in their musical expression. There is sufficient literary and iconographic evidence to conclude that music was performed with a solo instrument or voice, instruments in various combinations, and a solo instrument or ensemble of instruments with solo voice or a group of voices. The precise combination was partly a matter of the tradition for certain types of performances, but there can be little doubt that the preferences of the individual performers affected as well the particular combinations employed.

Whether idiophones, membranophones, aerophones, or chordophones, the general types of instruments used by the Greeks seem to have remained relatively stable over a long period of time, although particular instruments came in and out of favor and, with the possible exception of the percussion instruments, all the instruments—like their counterparts of any age—became mechanically more complex over the centuries. In iconographic sources, certain instruments appear only in relatively limited periods and some instruments never appear or—if they appear—have gone unrecognized. Other instruments are portrayed over several centuries with only the stylistic modifications consistent with changing artistic techniques. Nevertheless, with the possible exception of certain unusual cases like the pandoura and the Apulian instrument, iconographic evidence alone is insufficient to determine precise times and places in which instruments first appeared or ceased to be used. The iconographic record is often suggestive, but the extent to which it represents actual musical practice—and, indeed, the extent to which the surviving iconography is typical of the entire original body—is impossible to know. Likewise, the literary evidence is, for the most part, much later than the iconographic, although it may preserve parts of the earlier literary tradition. Full-scale treatises on musical instruments were written, but they survive only in fragments, if at all. And, though tremendously valuable and frequently illuminating, the archaeological evidence is quite limited. Only when considered as a complex do the sources provide a picture of some consistency and stability.

There is no question that a large part of the appeal of musical instruments in Greek culture was aesthetic. Their sound and appearance are often described in sensual terms and their iconography places them in scenes that range from the pleasant and appealing to the impressive and inspiring. Beyond this, the association of musical instruments with particular divinities provided a basis for the creation of affective responses that might complement or conflict with the responses elicited by other means, such as text, rhythm, tempo, melodic structure, and so on.

In view of the pervasive and powerful nature of music, it is hardly surprising that a body of music theory gradually emerged, attempting in various ways to explain the nature of music—its logic, structure, properties, component parts, notation, and so on—, its influence on human behavior and character, and even its extraordinary affinities with the design and organization of the cosmos. This remarkable body of literature forms the subject of the next chapters.

IV

Music Theory I: The Sources, Aristoxenus, and the *Sectio Canonis*

Poetry, drama, philosophy, collections of anecdotes, lexicography, and history—all these literary types have been important sources in the preceding chapters, and it is obvious that the general subject of music was deeply appealing and engrossing to ancient, Hellenistic, and Byzantine Greek writers. None of this material, however, is music theory in the broad sense of a technical or systematic literature devoted entirely to music. Yet there was a significant body of Greek literature that could properly be considered music theory, and although some of these works are now known only as titles mentioned in passing or as brief tantalizing quotations in the works of Athenaeus or similar sorts of writers, a substantial portion of Greek music theory does survive. Some of these treatises are simple technical manuals that nevertheless provide valuable detail about the musical system, including notation, the function and placement of notes in a scale, characteristics of consonance and dissonance, rhythm, and types of musical composition. Others are long and elaborate books viewing music as a science that reveals universal patterns of order leading to the highest levels of knowledge and understanding.

This literature is commonly known as "ancient Greek music theory" in the modern parlance of scholarship, but the phrase is something of a misnomer. In the first place, the majority of the surviving literature is not ancient in terms of having been written in the period before the first or second centuries B.C.E. With the exception of quotations in later literature,[1] the earliest surviving independent theoretical works are Aristoxenus's *Harmonica* and *Rhythmica*. Both of these are fragmentary, though the fragments are substantial. The *Sectio canonis* traditionally attributed to Euclid would be nearly contemporary if Euclid were the author,[2] but all the other treatises date from the end of the first century C.E. or later. In the second place, the modern conceptual meaning of the phrase "music theory" is foreign to these writings.[3] With the possible exception of the rather late writer Alypius (fl. fourth or fifth century C.E.), it is quite unlikely that any of the authors intended his work for practicing musicians or was concerned with actual pieces of music. When scholars expect specific sorts of analytical details in a "music theory" treatise—and then express frustration at their absence or hypothesize their presence in lost sources—, they impose a concept on the treatises that is foreign to their purpose.[4] Ancient Greek music theory is not primarily interested in the analysis of pieces of music or in explaining compositional or performance practice. This does not mean, of course, that the technical information cannot be applied to the surviving fragments, but it does mean that the treatises must be viewed within their own intellectual contexts, which differ among the treatises, if they are to be properly assessed.

---

[1] Most of these are brief, and their authenticity can rarely be proven. The most extended quotation is the Aristotelian *De audibilibus*, which is preserved only in Porphyrius's commentary (Düring 67.24–77.18) on Ptolemy's *Harmonica* (see chapter 6, pp. 509–20 *infra*). For a study of the treatise, see H. B. Gottschalk, "The *De audibilibus* and Peripatetic Acoustics," *Hermes* 96 (1968): 435–60.

[2] See pp. 344–46 *infra*. For the most thorough study of this treatise, including the question of authorship, see Barbera, *Euclidean Division of the Canon* (cf. chapter 1, n. 23).

[3] As it is to much of the specialized medieval Latin, Byzantine, and Arabic literature on music. The influence of ancient Greek music theory on some of this later literature is discussed in chapter 7.

[4] For examples, see Mountford and Winnington-Ingram, who write: "... apart from the fact that no theory can profess to give more than the osteology of an art, the Aristoxenian theory, as it has come down to us, is unsatisfying" ("Music," in *OCD*, 2d ed., 708); Winnington-Ingram: "... but theory is dead unless it can be illustrated by actual melodies" ("Greece, §I [Ancient]," in *NGD*, 7:659); or Henderson: "Such writers [i.e., the Greek theorists after the second century C.E.], however, cannot help us towards an understanding of contemporary music, as Aristoxenus does for an earlier epoch. In their textbooks nothing is more depressing than the fossilization of the doctrine of *melopoeia*—musical composition—as a mere branch of theoretical terminology" ("Ancient Greek Music," 375). By contrast, distinctions among the various types of "music theory" are commonly made by musicologists in discussions of medieval and Renaissance Latin and Byzantine music theory. For an overview, see Claude V. Palisca, "Theory, theorists," in *NGD*, 18:741–55.

As long as its imperfections are understood, "ancient Greek music theory" does provide a useful phrase in referring collectively to the specialized literature ranging from the Pythagorean excerpts quoted in various sources to the treatises of Porphyrius, Aristides Quintilianus, Alypius, and Bacchius Geron written between the third and fifth centuries C.E. With their scientific and technical view of ancient Greek music, all of them provide an invaluable complement to the musical iconography, the other types of literature, and the musical remains themselves.

There are two important and related matters that must be borne in mind when considering the music theory of the Greeks. First, the theory spans a period of over eight hundred years, only a few centuries of which coincide with the flowering of ancient Greek musical culture. Moreover, ancient Greek music theory represents at least four major philosophical schools: Pythagoreanism, Platonism, Aristotelianism, and neo-Platonism, each of which has its own conceptual framework, special uses of vocabulary, and objectives. Second, these conditions alone neither prove nor disprove the relevance of the treatises' theoretical constructions to Greek musical culture of any of the periods prior to their time. The various sources of all types—literary, iconographic, archaeological, and musical—are sufficiently complementary to suggest that the treatises of any period may represent in unaltered form the theory of a much earlier period. The absence of complementary evidence, however, means nothing one way or the other.

A more difficult problem in considering ancient Greek music theory is the nature of the sources themselves. Thousands of vase paintings and pieces of sculpture exist from the very periods in which they were created, as well as in later copies. The earliest musical fragments are separated by a span of less than two hundred years from the first productions of the tragedies they represent, and if they are later compilations for an individual performer,[5] they may even be contemporary with the time in which they were performed. Likewise, most of the later pieces with musical notation are contemporary with the theoretical works. But of the independent theoretical works themselves, none survives in any medium older than the eleventh century C.E.,[6] and with a few exceptions, even those quoted in other sources exist only in manuscripts of this period or later. The extent to which these later copies preserve the form and content of any of the treatises is, in general, impossible to determine. It is also impossible to be certain whether the titles and, indeed, even the author assigned to the treatises in the manuscripts represent the actual author and title of the treatise when it was first composed. There are also prior and largely unexplored questions: To what extent were the earliest treatises on ancient Greek music theory "composed" (in the modern sense of the term) by an individual author? Did they exist in some fixed written form or were they only later assembled by disciples or from tradition? In rare cases, it is possible to see at least some parts of the way in which a treatise "grows," even to the extent of changing its entire method of argumentation, as it is transmitted across the centuries.[7]

---

[5] As Comotti ("Words, Verse and Music in Euripides' Iphigenia in Aulis," 69–70) thinks is the case with the oldest fragment, *P.Leid.* Inv. 510. See chapter 2, pp. 111–16 and n. 182 *supra.*

[6] With the exception of a few fragments on papyrus. For a complete catalogue of the manuscripts preserving ancient Greek music theory, see Mathiesen, *Ancient Greek Music Theory* (cf. chapter 1, n. 22 *supra*; hereafter, this will be cited as *RISM BXI*, followed by the page number or, in cases where an entire manuscript description is relevant, the catalogue index number in boldface). For a history of the dissemination of the theory, see chapter 7 and Thomas J. Mathiesen, "Hermes or Clio? The Transmission of Ancient Greek Music Theory," in *Musical Humanism and Its Legacy: Essays in Honor of Claude V. Palisca*, ed. Barbara R. Hanning and Nancy K. Baker (New York: Pendragon Press, 1992), 3–35.

[7] André Barbera masterfully demonstrates this process in connection with the *Sectio canonis.* See his *Euclidean Division of the Canon* and "Reconstructing Lost Byzantine Sources for MSS Vat. BAV gr. 2338 and Ven. BNM gr. VI.3: What Is an Ancient Treatise?" in *Music Theory and Its Sources: Antiquity and the Middle Ages*, ed. André Barbera (Notre Dame, Ind.: Notre Dame University Press, 1990), 38–67. Latin and Byzantine theorists frequently adopted and adapted without attribution whole sections of earlier theoretical works. See Thomas J. Mathiesen, "Aristides Quintilianus and the *Harmonics* of Manuel Bryennius: A Study in Byzantine Music Theory," *Journal of Music Theory* 27 (1983): 31–47; and idem, *AQ on Music*, 5–6.

Similar problems exist for other Greek literary remains, and it should not be assumed for music theory that author attributions or the content of the text itself are unreliable.[8] On the contrary, there is abundant evidence showing that the corpus of ancient Greek music theory was regarded with particular interest and treated with great care from the very beginnings of classical scholarship.[9] In fact, the later musical treatises—along with anecdotal works such as Athenaeus's *Deipnosophistae* and lexicographic works such as Pollux's *Onomasticon* and Photius's *Bibliotheca*—are in a real sense the first stages of this scholarship. There is no reason not to trust the authenticity of the corpus of ancient Greek music theory—independent treatises and fragments—but the inherent limitations of the form in which it exists must be recognized.

The tradition of scholarship on ancient Greek music theory underscores a significance that goes beyond the evidence it supplies about the Greeks' own music. Ancient Greek music theory is also significant as an intellectual monument that exerted a profound influence on later Latin, Byzantine, and Arabic musical writings. Thus, it is important to consider the meaning of the theory not only in ancient Greek musical culture but also in the first millennium C.E. As an intellectual monument, the significance of ancient Greek music theory resides especially in later writers' use and understanding of the literature, not in the degree to which it presented them with an accurate picture of ancient Greek music.

Overview of the Sources

When this general definition of music theory is applied to the extant literature, the following group of authors writing independent treatises prior to the end of the fifth century C.E. can be identified with reasonable confidence:

---

[8] The potential problem is compounded by the process of modern textual criticism, which may produce a text that never existed at any time. See André Barbera, "New and Revived Approaches to Text Criticism in Early Music Theory," *Journal of Musicology* 9 (1991): 57–73.

[9] See chapter 7 and Thomas J. Mathiesen, "Towards a Corpus of Ancient Greek Music Theory: A New *Catalogue raisonné* Planned for RISM," *Fontes artis musicae* 25 (1978): 119–23 and 131–34; and idem, *RISM BXI, passim.*

Aristoxenus	375/360 B.C.E.–after 320 B.C.E.	*Harmonica* and *Rhythmica*
Cleonides	2d century C.E. [?]	*Harmonica introductio*
Nicomachus of Gerasa	fl. 100–150 C.E.	*Manuale harmonices*
Theon of Smyrna	fl. 115–140 C.E.	*Expositio rerum mathematicarum ad legendum Platonem utilium*
Claudius Ptolemy	fl. 127–148 C.E.	*Harmonica*
Gaudentius	3d or 4th century C.E.	*Harmonica introductio*
Porphyrius	232/3–ca. 305 C.E.	*In Ptolemaei Harmonica commentarium*
Aristides Quintilianus	late 3d–mid 4th century C.E.	*De musica*
Bacchius Geron	4th century C.E. or later	*Introductio artis musicae*[10]
Alypius	4th–5th century C.E.	*Introductio musica*

Sextus Empiricus and Philodemus of Gadara, too, devoted entire works to the subject of music; nevertheless, as their approach was principally philosophical, discussion of their treatises has been incorporated elsewhere in this book, especially in chapter 2. Figures such as Athenaeus and Pollux might well be placed on the list, but they were interested in music as polyhistorians, not as music theorists in the sense defined. Much of their work on music has already been considered in chapters 2–3.

---

[10] In twenty-two of the manuscripts, a second treatise is attached with the same title and author. On the basis of a little epigram that follows this second treatise in some—but by no means all—manuscripts and refers to a "Dionysius" and "The all-powerful Emperor Constantine (τὸν παμμέγιστον δεσπότην Κωνσταντῖνον)," it has been conjectured that the second treatise is by Dionysius, who would seem to have been a contemporary of Emperor Constantine the Great (ca. 272/73–337 C.E.). But in the earliest source of this treatise, Venetus Marcianus gr. app. cl. VI/10 (Mathiesen, *RISM BXI*, **273**), the epigram is separated from the treatise by a space of several lines and immediately precedes the hymns generally attributed to Mesomedes, who lived during the reign of Emperor Hadrian (117–38 C.E.). For a full discussion of this second treatise and Dionysius, see chapter 6, pp. 583–93 *infra;* on the hymns of Mesomedes, see chapter 2, pp. 56–58 *supra.*

Added to this group of authors should of course be anonymous works such as the Euclidean *Sectio canonis* and the Plutarchean *De musica*. Although the latter is more nearly historical than theoretical, it does include important technical and theoretical material that warrants its consideration under the topic of music theory. There is also a set of anonymous treatises, commonly known as Bellermann's Anonymous, that contains unique information on rhythmic notation, solmization, and compositional patterns. This is almost certainly a Byzantine work, but it is probably based on earlier material.

It happens that this particular group of music theorists—together with the Euclidean *Sectio canonis*, the Plutarchean *De musica*, and the *Harmonica* by the Byzantine scholar Manuel Bryennius (fl. 1300)—was identified as a set of authorities by the Byzantine scholars who preserved the theorists' work in some three hundred manuscripts. Not every work is transmitted in every manuscript of course, but groups of treatises—and on occasion nearly the entire set—appear time and again.[11] It seems reasonable therefore to take this set of treatises as the basis for the study of ancient Greek music theory.

As already noted, there are, of course, works of music theory that survive only as titles or as quotations within other treatises. These fragments may contain valuable information, but they must be considered within the context of the source that preserves them, not as independent works in their own right. As they can be read only through the filter of their excerptors, their authority, in the last analysis, can be no greater than the source excerpting them.

---

[11] See Mathiesen, *RISM BXI*, xxix–xxxi. For a fuller discussion of the transmission of the corpus of ancient Greek music theory, see chapter 7 and Mathiesen, "Hermes or Clio?"

Aristoxenus

Aristoxenus was certainly one of the most influential thinkers in Athens of the late fourth century B.C.E., and his strong association with the theory of music earned him the general appellation ὁ Μουσικός. He was born at Tarentum (probably around 360 B.C.E.) in Calabria on the tip of the Italian peninsula, which was a well-known center of Pythagoreanism.[12] His father, Spintharus (also called Mnesias), was himself a musician and Aristoxenus's first teacher. In his youth, Aristoxenus spent time in Mantineia, where he studied music with Lamprus of Erythrai. Sometime after 343 B.C.E., he went to Corinth and became acquainted with Dionysius, the tyrant of Syracuse. Finally, Aristoxenus travelled to Athens, where he became first a pupil of the Pythagorean philosopher Xenophilus of Chalcis and later a pupil of Aristotle. He seems to have held a senior position among Aristotle's pupils and expected to be named Aristotle's successor at the Lyceum. According to the *Suda*, the principal source of biographical information about Aristoxenus, when Theophrastus was named instead to head the Lyceum, Aristoxenus was intemperate in the expression of his disappointment.[13]

The *Suda* states that Aristoxenus wrote 453 books on music, philosophy, history, and every kind of education, but most of these survive only in brief quotations in the work of later authors such as Ammonius, Themistius, Diogenes Laertius, Stobaeus, and especially Athenaeus, Plutarch, Porphyrius, and Iamblichus. It can be deduced from these sources that Aristoxenus wrote biographies of Pythagoras, Archytas, Socrates, Plato, and Telestes; general works on the Pythagoreans; cultural and political works; a study of the tragedians; convivial essays; theological works; and a series of treatises on all aspects of music, including the history and science of music, musical acuity, dance, musical instruments, and the harmonia of the soul. Several of these, at least, were composed in multiple "books" (τὰ βιβλία), and the number given in the *Suda* should not be taken as 453 independent titles.[14]

---

[12] Tarentum (see map 2, p. 21) was also the birthplace of Philolaus, Lysis, and Archytas.

[13] *Suda,* s.v. Ἀριστόξενος: Ἀριστόξενος υἱὸς Μνησίου τοῦ καὶ Σπινθάρου, μουσικοῦ, ἀπὸ Τάραντος τῆς Ἰταλίας. διατρίψας δὲ ἐν Μαντινείᾳ φιλόσοφος γέγονε, καὶ μουσικῇ ἐπιθέμενος οὐκ ἠστόχησεν, ἀκουστὴς τοῦ τε πατρός καὶ Λάμπρου τοῦ Ἐρυθραίου, εἶτα Ξενοφίλου τοῦ Πυθαγορείου, καὶ τέλος Ἀριστοτέλους, εἰς ὃν ἀποθανόντα ὕβρισε, διότι κατέλιπε τῆς σχολῆς διάδοχον Θεόφραστον, αὐτοῦ δόξαν μεγάλην ἐν τοῖς ἀκροαταῖς τοῖς Ἀριστοτέλους ἔχοντος. γέγονε δὲ ἐπὶ τῶν Ἀλεξάνδρου καὶ τῶν μετέπειτα χρόνων, ὡς εἶναι ἀπὸ τῆς ριά ὀλυμπιάδος, σύγχρονος Δικαιάρχῳ τῷ Μεσσηνίῳ. συνετάξατο δὲ μουσικά τε καὶ φιλόσοφα καὶ ἱστορίας καὶ παντὸς εἴδους παιδείας· καὶ ἀριθμοῦνται αὐτοῦ τὰ βιβλία εἰς υνγ' (Bekker 170). The best modern source for Aristoxenus's biography is still Laloy, *Aristoxène de Tarente* (see chapter 1, n. 20 *supra*).

It is difficult to know whether references made by other Greek and Latin writers to this or that work of Aristoxenus constitute the actual titles of these works or whether they are merely general references to a work, for example, "on music" (περὶ μουσικῆς).[15] Nevertheless, for the sake of convenience, these sorts of references will be taken as actual titles.

The only works that survive in relatively substantial form are the so-called *Harmonica* and *Rhythmica*,[16] although there are also two excerpts—an extended one "On the chronos protos" and a brief one "On tonoi"—preserved in Porphyrius's commentary on Ptolemy's *Harmonica* 1.4. The first of these may very well be a part of the *Rhythmica* and the second a part of the *Harmonica*.

Harmonica

The *Harmonica* is commonly represented in modern editions and translations as composed of three books. Although this parallels most of the fifty codices preserving it, the arrangement is misleading. The two earliest codices, which date from the twelfth century C.E., present the "first book" under the heading "Before the *Elementa harmonica*" ('Αριστοξένου πρὸ τῶν ἀρμονικῶν στοιχείων). The earlier of the two codices, the famous Venetus Marcianus gr. app. cl. VI/3 once owned by Cardinal Bessarion, originally presented the "second and third books" as the first and second books of *Elementa harmonica* ('Αριστοξένου ἀρκὸν [*sic*] στοιχείων, πρῶτον and 'Αριστοξένου στοιχείων ἁρμονικῶν δεύτερον). This codex was corrected and annotated by several later hands, some of which may have begun their work not long after the principal scribe completed the first set of texts. One of the first "corrections" made was to change πρὸ τῶν in the first heading to πρῶτον; or, in other words, to change the sense of the heading from "Before the *Elementa harmonica*" to "The First Book of the *Elementa harmonica*." Then, of necessity, the πρῶτον and δεύτερον of the second and third headings had to be changed to δεύτερον and τρίτον. The other codex, Vaticanus gr. 2338, is probably younger by a few years. The first part of the "second book" was omitted in this manuscript and only later added in the margin by one of the several hands that corrected and annotated the manuscript. The heading itself, which does call this the "Second Book of *Elementa harmonica*," may also have been a later addition; as it happens, the heading for the "third book" omits a number altogether.[17]

---

[14] The Aristoxenian fragments are conveniently collected in Wehrli, *Aristoxenos*. The *Harmonica* has been edited and translated a considerable number of times, the *Rhythmica* somewhat less frequently. See the Bibliography under "Aristoxenus" for a list of editions and translations.

[15] "Titles" attributed to Aristoxenus include "On Pythagoras and his associates" (Περὶ Πυθαγόρου καὶ τῶν γνωρίμων αὐτοῦ), "On the Pythagorean life" (Περὶ τοῦ Πυθαγορικοῦ βίου), "Pythagorean sayings" (Πυθαγορικαὶ ἀποφάσεις), "Educational laws" (Παιδευτικοὶ νόμοι), "Political laws" (Πολιτικοὶ νόμοι), "The Customs of the Mantineians" (Μαντινέων ἔθη), "On tragic dance" (Περὶ τραγικῆς ὀρχήσεως), "On tragedians" (Περὶ τραγῳδοποιῶν), "Musical acuity" (Μουσικὴ ἀκρόασις), "On melic composition" (Περὶ μελοποιίας), "On choruses" (Περὶ χορῶν), "On musical instruments" (Περὶ ὀργάνων), "On auloi" (Περὶ αὐλῶν), "On auletes" (Περὶ αὐλητῶν), and "On the boring of auloi" (Περὶ αὐλῶν τρήσεως).

[16] Although these may not be the titles Aristoxenus intended, they can be conveniently retained for general reference to the two theoretical treatments.

While the evidence of the titles in these two manuscripts is not conclusive, it does suggest that there may be either two separate works—a preliminary or introductory treatment and the more detailed "Elements"—or a single long work divided into at least two major sections. Porphyrius's commentary on Ptolemy's *Harmonica* provides some evidence on the matter. It contains at least twenty identifiable references or quotations from Aristoxenus's *Harmonica*, and several of these attribute the reference or quotation to a specific work. For example, at the end of his commentary on chapter 2 of the first book of Ptolemy's *Harmonica*, Porphyrius, on the authority of a certain Didymus, describes Aristoxenus's views on the importance of perception in musical judgments. These descriptions accord rather closely with the surviving passages at the beginning of the second book of the *Harmonica* as commonly represented. Porphyrius's source, however, states that Aristoxenus makes these points in the introduction to the **first** book of his *Elementa harmonica,* which is indeed the title of this book in the earliest manuscript. Later, in his commentary on chapter 4, Porphyrius refers to the first book of Aristoxenus's *De principiis* (Περὶ ἀρχῶν), and this passage accords with a section in the first book of the *Harmonica* as commonly represented.[18]

---

[17] It is significant that the one other manuscript omitting the same extended passage at the beginning of the "second book," Romanus Angelicus gr. 35 (Mathiesen, *RISM BXI*, **205**), also omits the title. On these manuscripts and the complex problem of their relationship, see Mathiesen, *RISM BXI*, **234** and **270**; Barbera, "Reconstructing Lost Byzantine Sources," 38–67; Jon Solomon, "Vaticanus gr. 2338 and the Εἰσαγωγὴ ἁρμονική," *Philologus* 127 (1983): 247–53; Jan, *Musici scriptores graeci*, xvi–xxiv (Jan did not know Vaticanus gr. 2338); and da Rios, *Elementa harmonica*, xx–xxix.

Porphyrius's commentary would seem to indicate quite clearly that the first and second books of the *Harmonica* as it is commonly known are actually two separate works, a preliminary work on fundamental musical principles (*De principiis*) and a comprehensive work on harmonic elements (*Elementa harmonica*). In fact, at the end of the *De principiis,* Aristoxenus himself refers to the *Elementa* as if it were a separate work:

> It was necessary to inquire of the certain manner of continuity and consecuity; from the foregoing this is clear. How it arises and what intervals are or are not placed after what intervals will be shown in the *Elementa.*[19]

At the beginning of the traditional second book of the *Harmonica* as commonly known, Aristoxenus outlines the subjects that will be discussed and excludes both musical notation and the aulos as suitable bases for the investigation of music. Then, he refers to the current treatise as the *Elementa*:

> Now for anyone who would wish to review the so-called harmonic study, there are these things. As we are about to take up our study on the *Elementa,* it will be necessary to first know certain things. It is not possible to discuss this correctly without first beginning with three points: first, the phenomena must be correctly understood; second, anterior and posterior things must be rightly separated in the phenomena; and third, a result and conclusion must be duly estimated. As in every science, this one was established from many problems, and it is proper that the principles be taken, from which will then be shown the things beyond the principles. Now it will be necessary to turn our attention to two things: first, each of the problems taken as a

---

[18] For these passages, see Porphyrius *In Ptol. Harm.* 1.2 and 4 (Düring 28.22–23 and 80.22). The passages are also discussed in Annie Bélis, *Aristoxène de Tarente et Aristote: Le Traité d'harmonique,* Études et Commentaires, 100 (Paris: Klincksieck, 1986). She, however, concludes (pp. 47–48) that the three books as commonly represented do form a single long work divided into two major sections.

[19] τίνα μὲν οὖν τρόπον τό τε συνεχὲς καὶ τὸ ἑξῆς δεῖ ζητεῖν, σχεδὸν δῆλον ἐκ τῶν εἰρημένων· πῶς δὲ γίγνεται καὶ τί μετὰ τί διάστημα τίθεταί τε καὶ οὐ τίθεται, ἐν τοῖς στοιχείοις δειχθήσεται (da Rios 37.1-4).

> principle will be both true and a phenomenon; second, it will be estimated by the senses as among the first of the parts of the harmonic study. For what requires demonstration is not taken as a principle. In general, it is necessary to look closely into the establishment of a principle, lest we fall into a foreign land by making a principle out of a certain sound or motion of air and lest, in making a sharp turn, we lose many of our friends.[20]

Taken as a whole, the evidence seems compelling in favor of identifying the traditional first book of the *Harmonica* as a treatise entitled *De principiis* and the traditional second book as the first book of a treatise entitled *Elementa harmonica*.[21]

Assessment of the traditional third book of the *Harmonica* is more difficult.[22] It is composed of a series of declarative statements, each of which is subsequently expounded. As noted just above, the first book of the *Elementa harmonica* makes specific reference to the necessity of establishing principles from the investigation of problems, and it is noteworthy that in this "third book," Aristoxenus on several occasions calls the declarative statements "problems" (προβλήματα).[23] If these are the problems anticipated by Aristoxenus in the first book of the *Elementa harmonica,* their appearance as part of a second book of this treatise would be quite proper. In style and approach, the "third book" seems to contrast both with *De principiis* and with the first book of the *Elementa harmonica,* although the general points made by the declarative statements match quite closely the subjects articulated in these works. While Greek scientific treatises tend not to change their style and approach to such an extent from book to book, this "third book" could well be the second book of the *Elementa harmonica,* exactly as it is titled in the earliest of the manuscripts.

---

[20] Ἃ μὲν οὖν προδιέλθοι τις ἂν περὶ τῆς ἁρμονικῆς καλουμένης πραγματείας σχεδόν ἐστι ταῦτα· μέλλοντας δ' ἐπιχειρεῖν τῇ περὶ τὰ στοιχεῖα πραγματείᾳ δεῖ προδιανοηθῆναι τὰ τοιάδε· ὅτι οὐκ ἐνδέχεται καλῶς αὐτὴν διεξελθεῖν μὴ προϋπαρξάντων τριῶν τῶν ῥηθησομένων· πρῶτον μὲν αὐτῶν τῶν φαινομένων καλῶς ληφθέντων, ἔπειτα διορισθέντων ἐν αὐτοῖς τῶν τε προτέρων καὶ τῶν ὑστέρων ὀρθῶς, τρίτον δὲ τοῦ συμβαίνοντός τε καὶ ὁμολογουμένου κατὰ τρόπον συνοφθέντος. ἐπεὶ δὲ πάσης ἐπιστήμης, ἥ τις ἐκ προβλημάτων πλειόνων συνέστηκεν, ἀρχὰς προσῆκόν ἐστι λαβεῖν ἐξ ὧν δειχθήσεται τὰ μετὰ ἀρχάς, ἀναγκαῖον ἂν εἴη λαμβάνειν προσέχοντας δύο τοῖσδε· πρῶτον μὲν ὅπως ἀληθές τε καὶ φαινόμενον ἕκαστον ἔσται τῶν ἀρχοειδῶν προβλημάτων, ἔπειθ' ὅπως τοιοῦτον οἷον ἐν πρώτοις ὑπὸ τῆς αἰσθήσεως συνορᾶσθαι τῶν τῆς ἁρμονικῆς πραγματείας μερῶν· τὸ γάρ πως ἀπαιτοῦν ἀπόδειξιν οὐκ ἔστιν ἀρχοειδές. καθόλου δ' ἐν τῷ ἄρχεσθαι παρατηρητέον, ὅπως μήτ' εἰς τὴν ὑπερορίαν ἐμπίπτωμεν ἀπό τινος φωνῆς ἢ κινήσεως ἀέρος ἀρχόμενοι, μήτ' αὖ κάμπτοντες ἐντὸς πολλὰ τῶν οἰκείων ἀπολιμπάνωμεν (da Rios 54.11–55.7). Barker's translation of this passage (*Greek Musical Writings,* 2:158–59) omits altogether the point Aristoxenus makes about taking care in the establishment of a principle (ἐν τῷ ἄρχεσθαι παρατηρητέον) and spoils the final metaphor of falling into a foreign land or taking a sharp turn and losing one's companions. Moreover, by translating πρόβλημα as "proposition" rather than "problem," he obscures the technical relationship between Aristoxenus's vocabulary and the vocabulary of the Aristotelian *Problemata,* which he calls "Problems" (*Greek Musical Writings,* 2:85). Macran's translation of the passage (*The Harmonics of Aristoxenus,* edited with translation, notes, introduction, and index of words by Henry S. Macran [Oxford: Clarendon, 1902; reprint, Hildesheim: G. Olms, 1974], 197–98), contrary to Barker's dismissal of it, is much closer to Aristoxenus.

[21] Bélis, *Aristoxène de Tarente et Aristote,* 34–35 (following Laloy, *Aristoxène de Tarente,* 36), observes that such an arrangement echoes Aristotle's scientific procedure as outlined at the very beginning of the *Physica.*

[22] Laloy (*Aristoxène de Tarente,* 38–39) sees the "third book" as a "seconde rédaction" of the *Elementa.*

The series of problems—or, in other words, the second book of the *Elementa harmonica*—is truncated at the point where it begins to consider the species of the interval of a fourth. It may originally have included the larger intervals described in the first book of the *Elementa harmonica,* and indeed, truncation may also have occurred at the beginning of the series. Nevertheless, enough remains to provide a clear picture of the overall content, structure, and design of the *Elementa harmonica.*

Aristoxenus is highly systematic in the internal arrangement of each treatise and the relationship of the *Elementa* to *De principiis.* The systematic internal arrangement can be discovered most easily in *De principiis,* which seems to have survived more or less complete until a point very near the end. The following outline shows the order and arrangement of topics; beginning with section III, the parenthetical references note the relationship of each section to the "Outline of the Study" articulated in section II. References to the page and line numbers of Rosetta da Rios's edition of the text are provided in brackets.

---

[23] For the reference from the first book of the *Elementa harmonica,* see the quotation on the previous page. References to the declarative statements as "problems" appear in da Rios 75.16, 78.3–4, 85.9, and 85.15.

Aristoxenus, *De principiis*

- I. Introduction [da Rios 5–7.8]
  - A. The Harmonic Treatise (ἡ ἁρμονικὴ πραγματεία)
  - B. The Harmonicists (οἱ ἁρμονικοί)
- II. Outline of the Study [dR 7.9–12.18]
  - A. Motion of the Voice (ἡ τῆς φωνῆς κίνησις) [dR 7.9–22]
    - 1. speaking
    - 2. singing
  - B. Loosening, Stretching (ἄνεσις, ἐπίτασις) [dR 7.23–8.2]
  - C. Height, Depth (βαρύτης, ὀξύτης) [dR 8.2]
  - D. Pitch (τάσις) [dR 8.2–3]
  - E. Compass (ἡ τοῦ βαρέος τε καὶ ὀξέος διάτασις) [dR 8.5–7]
  - F. Intervals (διαστήματα): General [dR 8.7–9]
  - G. Scales (συστήματα): General [dR 8.9–10]
  - H. Melos (μέλος) [dR 8.11–9.2]
    - 1. musical
    - 2. other
  - I. Continuity, Consecution (συνέχεια, ἑξῆς) [dR 9.3–4]
  - J. Genera (γένη) [dR 9.5–10]
  - K. Intervals: Simple, Complex (ἀσύνθετος, σύνθετος) [dR 9.10–12]
  - L. Synthesis (σύνθεσις) [dR 9.12–10.9]
  - M. Scales: Perfect and Others (τέλειον, ἄλλον) [dR 10.10–11.10]
  - N. Mixing of Genera (μιγνύμενος τῶν γενῶν) [dR 11.12–17]
  - O. Notes (φθόγγοι) [dR 11.17–19]
  - P. Position of the Voice (ὁ τῆς φωνῆς τόπος) [dR 12.1–18]
  - Q. Conclusion [dR 13.1–6]
- III. Motion (II A) [dR 13.7–15.5]
  - A. Continuous
  - B. Intervallic
- IV. Stretching and Loosening (II B) [dR 15.6–16.14]
  - A. Movement
  - B. Contrasted to Height and Depth
- V. Height and Depth (II C) [dR 16.15–17.2]
  - A. Cause and Effect
  - B. Contrasted to Stretching and Loosening
- VI. Pitch (II D) [dR 17.2–18.21]
  - A. Definition
  - B. Comparison with the Definition of the Physicists
  - C. Contrasted to Stretching and Loosening, Height and Depth
- VII. Compass (II E) [dR 19.1–20.14]
  - A. Magnitude
  - B. Smallness
- VIII. Notes (II O) [dR 20.15–21.16]
  - A. Definition
  - B. Function
- IX. Intervals (II F) [dR 21.17–22.3]
  - A. Magnitude
  - B. Consonant, Dissonant
  - C. Compound, Simple
  - D. Genus
  - E. Rational, Irrational
- X. Scales (II G) [dR 22.3–23.8]
  - A. Magnitude
  - B. Consonant, Dissonant
  - C. Genus
  - D. Rational, Irrational
  - E. Conjunct, Disjunct, Combined
  - F. Gapped, Continuous
  - G. Single, Double, Multiple
- XI. Melos (II H) [dR 23.9–24.15]
  - A. Speech
  - B. Music

XII. Genera (II J) [dR 24.16–25.4]
  A. Diatonic
  B. Chromatic
  C. Enharmonic
XIII. Intervals (II K) [dR 25.5–28.2]
  A. Consonant, Dissonant
  B. Consonant
    1. largest
    2. smallest
  C. Whole-tone
    1. half-tone
    2. third-tone
    3. quarter-tone
XIV. Notes (II O) [dR 28.3–35.8]
  A. Order
  B. Immovable
  C. Movable
    1. lichanos
    2. parhypate
    3. pycnon and diatonic tetrachord
      a. harmonia
      b. color
      c. hemiolic color
      d. whole-tone color
      e. low diatonic
      f. high diatonic
      g. comparisons
XV. Continuity and Consecution (II I) [dR 35.9–38.6]
  A. Continuity
    1. speech
    2. music
  B. Consecution
    1. contrast with continuity
    2. musical function
      a. fourth notes
      b. fifth notes

Aristoxenus begins *De principiis* by carefully delimiting the subject, defining his terms, and pointing out the errors of his predecessors. The study called "harmonics," he observes, pertains to the theory of scales and tonoi; the use of these scales and tonoi for poetic coloration is part of the larger science of music.[24] Earlier authors, the Harmonicists, had based their theory on a single genus in the range of an octave, which they had represented in a series of diagrams. Aristoxenus asserts that such an approach demonstrates nothing at all, and he derides the Harmonicists for their errors.[25]

---

[24] τυγχάνει γὰρ οὖσα πρώτη τῶν θεωρητικῶν, ταύτης δ' ἐστὶν ὅσα συντείνει πρὸς τὴν τῶν συστημάτων τε καὶ τόνων θεωρίαν. ... τὰ δ' ἀνώτερον ὅσα θεωρεῖται χρωμένης ἤδη τῆς ποιητικῆς τοῖς τε συστήμασι καὶ τοῖς τόνοις οὐκέτι ταύτης ἐστίν, ἀλλὰ τῆς ταύτην τε καὶ τὰς ἄλλας περιεχούσης ἐπιστήμης, δι' ὧν πάντα θεωρεῖται τὰ κατὰ μουσικήν (da Rios 5.7–6.5). On the tonoi, see pp. 318 and 322–23 *infra*.

[25] Aristoxenus's assertion is supported to some extent by the scalar tables preserved in Ptolemy *Harmonica* 2.14, to which Aristoxenus would have objected as fundamentally unmusical. In addition to the supposed scales defined by Aristoxenus, Ptolemy's tables represent scales of Archytas, Eratosthenes, Didymus, and Ptolemy himself. Among this group, only Archytas lived prior to Aristoxenus. The identity of the Harmonicists remains a matter of conjecture. For one possible explanation, see Andrew Barker, "ʽΟΙ ΚΑΛΟΥΜΕΝΟΙ ʽΑΡΜΟΝΙΚΟΙ: The Predeces-

Although the precise nature of the Harmonicists' diagrams cannot be determined, they may very well have been something like the diagrams produced by later monochord theorists, especially those concerned with the subtle tuning problems of the fourteenth and fifteenth centuries C.E.[26] Diagrams of this sort indeed show the "close-packing" (καταπύκνωσις) of intervals that Aristoxenus describes as a feature of the Harmonicists' diagrams, and since they are intended to illustrate all the locations where pitches might be found rather than any actual scale, they also fail to show, in Aristoxenian terms, anything at all about actual scales or tonoi.

Aristoxenus refers to καταπύκνωσις on only two occasions in the treatise *De principiis*. The first instance occurs in section II/P,[27] where he observes that there is a close relationship among scales, positions of the voice, and the tonoi, a relationship that must be examined not by close-packing, as do the Harmonicists, but rather in the reciprocal melodic relationships of the scales themselves. Aristoxenus adds that some of the Harmonicists actually did touch on this subject quite by accident when they closely packed the diagram, but he does not explain how this may have occurred.[28] The second reference to καταπύκνωσις appears in section XV when Aristoxenus contrasts continuity (συνέχεια) and consecution (ἑξῆς). Here, he observes that musical continuity is a matter of the nature of melody, not a series of consecutive notes

---

sors of Aristoxenus," *Proceedings of the Cambridge Philological Society* 24 (1978): 1–21.

[26] See, for example, the diagram generated from Prosdocimo de' Beldomandi's *Parvus tractatulus de modo monacordum dividendi*, ed. and trans. Jan W. Herlinger, Greek and Latin Music Theory, vol. 4 (Lincoln: University of Nebraska Press, 1987), 118.

[27] References to sections within the treatise will follow the outline on pp. 300–301 rather than the traditional "section" numbers, which simply reflect the pagination of Meibom's edition and have nothing to do with the actual structure of the treatise.

[28] περὶ δὲ συστημάτων καὶ τόπον οἰκειότητος καὶ τῶν τόνων λεκτέον οὐ πρὸς τὴν καταπύκνωσιν βλέποντας καθάπερ οἱ ἁρμονικοὶ ἀλλὰ τὴν πρὸς ἄλληλα μελῳδίαν τῶν συστημάτων οἷς ἐπὶ τίνων τόνων κειμένοις μελῳδεῖσθαι συμβαίνει πρὸς ἄλληλα (da Rios 12.8–12).

closely packed together on a chart with the smallest possible interval separating one from another.[29]

The very first paragraphs of *De principiis*, then, make it clear that Aristoxenus intends to define and deal with a series of constituent parts in order to establish a more complete and correct view of the musical reality of scales and tonoi, the two primary building-blocks of musical composition. As might be expected, this accords with Aristotle's method as described at the very beginning of his *Physica*: in any object of inquiry, one begins with its primary conditions or first principles and carries these forward to the basic elements.[30] In *Physica* 1.2, Aristotle observes that there must be but a single principle or more than one, and this leads him to the primary topic of motion, which occupies *Physica* 3 (200b12–202b29). Because motion involves change of position, *Physica* 4 (208a27–213a11) is devoted to a consideration of the meaning of "position" (τόπος), including the regions of up and down and the matter of size and dimension. Thus, it is surely no coincidence that the first and last principles in Aristoxenus's list are "Motion of the Voice" and "Position of the Voice." He links them in his initial outline (section II/A), which is filled with echoes of Aristotle's *Physica*:

> First of all these things, it is necessary to distinguish, for future reference, "motion of the voice," so that with respect to melos, it may be treated as a position. It happens that there is not just one style of motion: this aforesaid motion is begun either by our speaking or by our singing (it is evident that "high" and "low" are present in both of these, and the motion in which high and low occur is a motion with respect to position), but both are not the same species of motion. What difference there is between both of these has not by any means been carefully distinguished, and indeed, since this has not been distinguished, it is not altogether easy to speak about a note and what it really is. If we do not wish to be in the same class as Lasus and certain of the Epigonians who think that a note has breadth, it is necessary to speak about this a little more accurately.[31]

---

[29] ζητητέον δὲ τὸ συνεχὲς οὐχ ὡς οἱ ἁρμονικοὶ ἐν ταῖς τῶν διαγραμμάτων καταπυκνώσεσιν ἀποδιδόναι πειρῶνται, τούτους ἀποφαίνοντες τῶν φθόγγων ἑξῆς ἀλλήλων κεῖσθαι οἷς συμβέβηκε τὸ ἐλάχιστον διάστημα διέχειν ἀφ' αὑτῶν. ... ἀλλὰ πρὸς τὴν τῆς μελῳδίας φύσιν πειρατέον βλέπειν κατανοεῖν τε προθυμούμενον τί μετὰ τί πέφυκεν ἡ φωνὴ διάστημα τιθέναι κατὰ μέλος (da Rios 36.1–5, 14–16).

[30] τότε γὰρ οἰόμεθα γινώσκειν ἕκαστον, ὅταν τὰ αἴτια γνωρίσωμεν τὰ πρῶτα καὶ τὰς ἀρχὰς τὰς πρώτας καὶ μέχρι τῶν στοιχείων (Bekker 184a12–14).

[31] Πρῶτον μὲν οὖν ἁπάντων τὴν τῆς φωνῆς κίνησιν διοριστέον τῷ μέλλοντι πραγματεύσθαι περὶ μέλους αὐτὴν τὴν κατὰ τόπον. οὐ γὰρ εἷς τρόπος αὐτῆς ὢν

After briefly introducing the remaining topics in section II/B–P, Aristoxenus concludes (section II/Q) that these and only these are the topics of harmonic science (ἁρμονικὴ ἐπιστήμη); beyond lies a more advanced science, about which he promises to speak at the proper time. First, however, he intends to detail each topic of this primary science.

In sections III–VI, Aristoxenus draws important distinctions among continuous and intervallic motion of the voice; movement from low to high vocal register, by the analogy of stretching and relaxing strings; the condition of height and depth, which results from the process of stretching and relaxing; and pitch itself. When the human voice moves its position continuously "so as to seem to be nowhere stationary," Aristoxenus defines the result as speaking. But when the voice moves from specific positions to other specific positions—that is, it stands upon one pitch after another, "stepping over the positions bounded by the pitches"—, Aristoxenus observes that "this phenomenon is present not in speaking but in singing."[32] The more precise the intervallic positioning, the more accurate the melos will appear to the senses. In order for the voice to move from one position to another, it must stretch to a higher position and relax to a lower. These stretchings and relaxings must be imperceptible in singing, and at the end of each process, a position of height or depth will have been reached. The action of stretching and relaxing is differentiated from the condition of height and depth, and the actions and conditions themselves are also differentiated. Thus, Aristoxenus identifies "five items distinct from one another: pitch, height, depth, and in addition to these, relaxing and stretching."[33] The casual observer

---

τυγχάνει· κινεῖται μὲν γὰρ καὶ διαλεγομένων ἡμῶν καὶ μελῳδούντων τὴν εἰρημένην κίνησιν—ὀξὺ γὰρ καὶ βαρὺ δῆλον ὡς ἐν ἀμφοτέροις τούτοις ἔνεστιν, αὕτη δ' ἐστὶν ἡ κατὰ τόπον καθ' ἣν ὀξύ τε καὶ βαρὺ γίγνεται—ἀλλ' οὐ ταὐτὸν εἶδος τῆς κινήσεως ἑκατέρας ἐστίν. ἐπιμελῶς δ' οὐδενὶ πώποτε γεγένηται περὶ τούτου διορίσαι τίς ἑκατέρας αὐτῶν ἡ διαφορά· καί τοι τούτου μὴ διορισθέντος οὐ πάνυ ῥᾴδιον εἰπεῖν περὶ φθόγγου τί ποτ' ἐστίν. ἀναγκαῖον δὲ τὸν βουλόμενον μὴ πάσχειν ὅπερ Λάσος τε καὶ τῶν Ἐπιγονείων τινὲς ἔπαθον, πλάτος αὐτὸν οἰηθέντες ἔχειν, εἰπεῖν περὶ αὐτοῦ μικρὸν ἀκριβέστερον (da Rios 7.9–22). On Lasus and Epigonus in connection with this passage, see also chapter 3, p. 271 *supra*.

[32] ... ὥστε μηδαμοῦ δοκεῖν ἵστασθαι. ... ὑπερβαίνουσα μὲν τοὺς περιεχομένους ὑπὸ τῶν τάσεων τόπους ... τὸν τοῦτο φαινόμενον ποιεῖν οὐκέτι λέγειν φασὶν ἀλλ' ᾄδειν (da Rios 14.14, 13.18–20, and 14.16–17).

[33] ὅτι μὲν οὖν πέντε ταῦτ' ἐστὶν ἀλλήλων ἕτερα, τάσις τε καὶ ὀξύτης καὶ βαρύτης πρὸς δὲ τούτοις ἄνεσίς τε καὶ ἐπίτασις, ... (da Rios 18.18–20).

might think that height and depth are synonymous with pitch, but Aristoxenus recognizes the need for a more functional definition: for now, he simply states that pitch is "a certain hesitation and positioning of the voice."[34]

Aristoxenus realizes that by defining pitch as hesitation and position, he seems to contradict the physical definition of sound as a pulsation of the air. He therefore clarifies that the terms in his definition refer to a specific condition of pitch in which the motions that produce it remain stable. The simple physical definition of pitch provides no basis for differentiating among pitches: all pitches are motion. Aristoxenus's definition, by contrast, is more subtle because it allows for differentiation of pitch by position, and in consequence the relationship of one pitch to another in the context of a musical phenomenon can become an important part of its definition.

With the broadest phenomena of music established, Aristoxenus now undertakes to provide essential limitations in sections VII–X. While the compass between depth and height may be limitless in physical theory, in terms of harmonic science, the compass is clearly subject to the limitations of human and instrumental voices, or in other words, "the production of sound and the discrimination of it, that is, the voice and the hearing."[35] In the case of the smallest compass, Aristoxenus thinks the voice and hearing reach their limits with the smallest diesis, approximately a quarter tone. He concedes that hearing can extend beyond the largest compass a voice can produce, but this does not alter his premise: in terms of practical musical sounds, "the compass of depth and height will not be extended into infinity with respect to either position."[36]

In the outline of section II, Aristoxenus had not proposed to discuss notes in detail until section XIV, but in order to further define compass in musical terms as a series of intervals and scales, he must define a note (φθόγγος). He has used the term a few times in passing prior to this point, but now in section VIII he clarifies its meaning by carefully building his definition on terms he has already introduced and developed: φωνή (voice), τάσις (pitch), and φθέγγομαι (produce a sound):

---

[34] μονή τις καὶ στάσις τῆς φωνῆς (da Rios 17.3–4).

[35] πρός τε τὸ φθεγγόμενον καὶ τὸ κρῖνον· ταῦτα δ’ ἐστὶν ἥ τε φωνὴ καὶ ἡ ἀκοή (da Rios 19.11–12).

[36] ἡ τοῦ βαρέος τε καὶ ὀξέος διάτασις οὐκ εἰς ἄπειρον ἐφ’ ἑκάτερα κινηθήσεται (da Rios 20.9–10).

> To speak briefly, a falling of the voice on one pitch is a note. Then, it appears to be a note as such because it is ordered in a melos and stands harmonically on a single pitch. Now such is a note.[37]

The definition is at once economical and highly sophisticated. It distinguishes among a voice, which is merely articulate sound; a single pitch, which is merely a position of a voice; and a note, which is a production of sound at a single relative ordered position within a coherent musical composition, a melos.[38]

Building on his definition of the note, Aristoxenus quickly observes that an interval (διάστημα) is bounded by two notes of different pitch while a scale (σύστημα) comprises more than one interval. In a sense, he had already assumed the concept of an interval in distinguishing between continuous and intervallic motion of the voice, but this more specific, albeit brief, restatement in the context of his newly concentrated definition of the note helps to focus definition of the interval in terms of musical function. Aristoxenus recognizes that there may be some objections to these brief definitions: "For it is hard in all things, especially those in principle, to say that a definition is both unassailable and a critical interpretation, and especially in the case of these three things: note, interval, and scale."[39] With this request for forbearance, he proceeds to a development in the two following sections (IX–X) on intervals and scales. The definition of the note, of course, will be considerably expanded in section XIV.

---

[37] συντόμως μὲν οὖν εἰπεῖν φωνῆς πτῶσις ἐπὶ μίαν τάσιν ὁ φθόγγος ἐστί· τότε γὰρ φαίνεται φθόγγος εἶναι τοιοῦτος οἷος εἰς μέλος τάττεσθαι ἡρμοσμένον ⟨τὸ⟩ ἑστάναι ἐπὶ μιᾶς τάσεως. ὁ μὲν οὖν φθόγγος τοιοῦτος ἐστίν (da Rios 20.16–19).

[38] On the meaning of melos, see chapter 2, pp. 25–26 *supra*. Previous editors such as Meibom, Marquard, Westphal, and Macran have found the passage inadequate and have emended it by reading ὅταν ἡ φωνὴ φανῇ ἑστάναι in place of da Rios's simpler reading ⟨τὸ⟩ ἑστάναι. Barker's translation (*Greek Musical Writings*, 2:136) follows the emended text and reads "for it is when the voice appears to rest at one pitch that there seems to be a note capable of being put into a position in a harmonically attuned melody." The emended text, however, obscures Aristoxenus's meaning on a number of points: most important, it is clearly not his point that a note is capable of being placed in a melos **when** it appears to rest on a single pitch but rather that it is a note **because** it stands on a single pitch ordered in a melos. It is the context that differentiates a note from a pitch, not the characteristic of it being a single pitch, which would provide no basis for differentiating between a note and a pitch.

[39] χαλεπὸν γὰρ ὑπὲρ πάντων μὲν ἴσως τῶν ἐν ἀρχῇ λόγον ἀνεπίληπτόν τε καὶ διηκριβωμένην ἑρμηνείαν ἔχοντα ῥηθῆναι, οὐχ ἥκιστα δὲ περὶ τριῶν τούτων, φθόγγου τε καὶ διαστήματος καὶ συστήματος (da Rios 21.13–16).

Aristoxenus stresses the primacy of intervals by formulating five distinctions—magnitude, consonant or dissonant, simple or compound, genus, and rational or irrational—that also provide the first four distinctions applied to scales. Only the third distinction cannot be applied to scales because by definition, all scales contain within themselves more than one interval. Three additional distinctions are then posited for scales: conjunct, disjunct, or combined; gapped or continuous; and single, double, or multiple. Each of these, Aristoxenus promises, will later be explained, and in fact, a discussion of conjunct, disjunct, and combined scales does appear in the *Elementa*. In the midst of it, the surviving treatise is truncated. Nevertheless, a reasonably clear view of all these distinctions survives in later treatises, if not always in Aristoxenus's own distinctive language.[40]

To this point, with the exception of section VIII, Aristoxenus has followed the order of topics outlined in section II/A–G. Each of these topics can be applied to some extent both to the speaking and to the singing voice. Motion, stretching and loosening, height and depth, pitch, compass, and even interval and scale (sections III–VII and IX–X)—none of these has to be conceived in specifically musical terms, and Aristoxenus is clearly aware of the duality as he develops the concepts. In section XI, however, Aristoxenus uses the duality of the term "melos" itself to concentrate his focus on the specifically musical.

> Now that these matters concerning melos have been distinguished and defined, we should attempt to outline what indeed is the nature of melos. It has been defined that motion of the voice in melos must be intervallic, and so musical melos is distinguished by this from speech-song. Speech-song is said to be a sort of melos composed of the accents in the words, for this stretching and loosening is natural in speaking.[41] Since harmonious melos must be comprised not only of intervals and notes but also needs a synthesis of a certain

---

[40] See chapters 5 and 6 *infra*.

[41] For a full discussion of the natural rise and fall of pitch inherent in the Greek language, and the extent to which the accents are indicative of it, see Stanford, *Sound of Greek* (see chapter 2, n. 87); and W. Sidney Allen, *Accent and Rhythm: Prosodic Features of Latin and Greek: A Study in Theory and Reconstruction*, Cambridge Studies in Linguistics, vol. 12 (Cambridge: Cambridge University Press, 1973).

> kind and not happenstance—it is evident that the comprising of intervals and notes is a common thing, for it arises even in anharmonious melos—, so, since this is true, the greatest part and fullest inclination towards the correct arrangement of melos has to be understood in terms of synthesis and its individual nature. It is evident that musical melos will, on the one hand, differ from melos arising in diction by its use of intervallic motion of the voice and, on the other hand, differ from anharmonious and faulty melos in the difference of the synthesis of simple intervals. As to this synthesis, it will be shown in the future what is its manner; for now, let us generally say only this much: although there are many differences of harmonious melos with respect to the synthesis of intervals, nevertheless, there is a certain thing that, with respect to every harmonious melos, is said to be one and the same thing; it has so great a function that if this is removed, harmoniousness is removed. This will be the single matter of the treatise as it proceeds. Now let musical melos be thus distinguished from the others.[42]

As has been characteristic of Aristoxenus, this section, too, is concerned with developing subtle definitions that address the musical phenomena. By emphasizing that the intervals must be organized in a certain manner, Aristoxenus distinguishes between simple intervallic motion of the voice, as earlier defined, and a certain type that may properly be termed musical melos. The key is "synthesis," by which Aristoxenus means a coherent musical arrangement of intervals. Although the concept has appeared in *De principiis* prior to this point, especially in section II/L, Aristoxenus does not clarify its meaning until section XV:

---

[42] Τούτων δ' οὕτως ἀφωρισμένων τε καὶ προδιῃρημένων περὶ μέλους ἂν εἴη ἡμῖν πειρατέον ὑποτυπῶσαι τί ποτ' ἐστὶν ἡ φύσις αὐτοῦ. ὅτι μὲν οὖν διαστηματικὴν ἐν αὐτῷ δεῖ τὴν τῆς φωνῆς κίνησιν εἶναι προείρηται, ὥστε τοῦ γε λογώδους κεχώρισται ταύτῃ τὸ μουσικὸν μέλος· λέγεται γὰρ δὴ καὶ λογῶδές τι μέλος, τὸ συγκείμενον ἐκ τῶν προσῳδιῶν τῶν ἐν τοῖς ὀνόμασιν· φυσικὸν γὰρ τὸ ἐπιτείνειν καὶ ἀνιέναι ἐν τῷ διαλέγεσθαι. ἐπεὶ δ' οὐ μόνον ἐκ διαστημάτων τε καὶ φθόγγων συνεστάναι δεῖ τὸ ἡρμοσμένον μέλος, ἀλλὰ προσδεῖται συνθέσεώς τινος ποιᾶς καὶ οὐ τῆς τυχούσης—δῆλον γὰρ ὡς τό γ' ἐκ διαστημάτων τε καὶ φθόγγων συνεστάναι κοινόν ἐστιν, ὑπάρχει γὰρ καὶ τῷ ἀναρμόστῳ—, ὥστ' ἐπειδὴ τοῦθ' οὕτως ἔχει, τὸ μέγιστον μέρος καὶ πλείστην ἔχον ῥοπὴν εἰς τὴν ὀρθῶς γιγνομένην σύστασιν τοῦ μέλους ⟨τὸ⟩ περὶ τὴν σύνθεσίν που καὶ τὴν ταύτης ἰδιότητα ὑποληπτέον εἶναι. σχεδὸν δὴ φανερόν, ὅτι τοῦ μὲν ἐπὶ τῆς λέξεως γιγνομένου μέλους τῷ διαστηματικῇ χρῆσθαι τῇ τῆς φωνῆς κινήσει διοίσει τὸ μουσικὸν μέλος, τοῦ δ' ἀναρμόστου καὶ διημαρτημένου τῇ τῆς συνθέσεως διαφορᾷ τῆς τῶν ἀσυνθέτων διαστημάτων. περὶ ἧς ἐν τοῖς ἔπειτα δειχθήσεται τίς ἐστιν αὐτῆς ὁ τρόπος, πλὴν ἐπὶ τοσοῦτόν γ' εἰρήσθω καθόλου καὶ νῦν, ὅτι πολλὰς ἔχοντος διαφορὰς τοῦ ἡρμοσμένου κατὰ τὴν τῶν διαστημάτων σύνθεσιν, ὅμως ἔστι τι τοιοῦτον ὃ κατὰ παντὸς ἡρμοσμένου ῥηθήσεται ἕν τε καὶ ταὐτόν, τοιαύτην ἔχον δύναμιν οἵαν αὐτὴν ἀναιρουμένην ἀναιρεῖν τὸ ἡρμοσμένον. ἁπλοῦν δ' ἔσται προϊούσης τῆς πραγματείας. τὸ μὲν οὖν μουσικὸν μέλος ἀπὸ τῶν ἄλλων οὕτως ἀφωρίσθω (da Rios 23.9–24.13).

> It is apparent that there is a certain nature of continuity in melody, as there is in diction in terms of the synthesis of letters; for in the nature of speaking, the voice, with respect to each of the syllables, places one of the letters first and second and third and fourth and so on for the rest of the numbers; not every one after every one, rather there is a certain natural outgrowth of the synthesis. This is nearly the same in singing where the voice places, with respect to continuity, the intervals and the notes, observing a natural synthesis, not singing every interval after every interval, whether equal or unequal.[43]

Contrary to this natural musical synthesis are the closely packed diagrams of the Harmonicists, which suggest that one might sing every pitch or any set of pitches, one after another, without regard to musical logic. In fact, when Aristoxenus first introduces the concept of synthesis in section II/L–M as one of the important topics to be treated, he notes that the Harmonicists and, in particular, Eratocles failed to properly understand this crucial musical concept and, in consequence, the musical phenomena themselves.

Aristoxenus's references to Eratocles, though offered in passing, nevertheless make it clear that Aristoxenus regarded the fourth and the fifth, not the octave, as the primary intervallic or scalar components of music and music theory. Eratocles, it seems, was simply interested in the possible cyclic orderings of the intervals in an octave, which led him—long before Ptolemy's *Harmonica*—to observe seven species.[44] Aristoxenus derides this mechanical manipulation because it does not take into account the possible species of the fifth and fourth and the various musical syntheses, which would produce many more than seven species.[45]

---

[43] φαίνεται δὲ τοιαύτη τις φύσις εἶναι τοῦ συνεχοῦς ἐν τῇ μελῳδίᾳ οἵα καὶ ἐν τῇ λέξει περὶ τὴν τῶν γραμμάτων σύνθεσιν· καὶ γὰρ ἐν τῷ διαλέγεσθαι φύσει ἡ φωνὴ καθ' ἑκάστην τῶν ξυλλαβῶν πρῶτόν τι καὶ δεύτερον τῶν γραμμάτων τίθησι καὶ τρίτον καὶ τέταρτον καὶ κατὰ τοὺς λοιποὺς ἀριθμοὺς ὡσαύτως, οὐ πᾶν μετὰ πᾶν, ἀλλ' ἔστι τοιαύτη τις φυσικὴ αὔξησις τῆς συνθέσεως. παραπλησίως δὲ καὶ ἐν τῷ μελῳδεῖν ἔοικεν ἡ φωνὴ τιθέναι κατὰ συνέχειαν τά τε διαστήματα καὶ τοὺς φθόγγους φυσικήν τινα σύνθεσιν διφυλάττουσα, οὐ πᾶν μετὰ πᾶν διάστημα μελῳδοῦσα οὔτ' ἴσον οὔτ' ἄνισον (da Rios 35.10–36.1).

[44] Ptolemy's *Harmonica* is discussed on pp. 429–94 *infra*. For an overview of the various species of the octave, fifth, and fourth, and their treatment in early theoretical sources, see André Barbera, "Octave Species," *Journal of Musicology* 3 (1984): 229–41. Inasmuch as Ptolemy's theoretical formulations of octave species and their related tonoi are commonly reported in modern textbooks and works of scholarship as if they were full and accurate representations of the ancient Greek theoretical system, it is important to stress two points: first, Ptolemy's seven octave species are adaptations from earlier sources; and second, Aristoxenus, five hundred years earlier than Ptolemy and the only author of a surviving treatise nearly contemporary with the music of the Periclean Age, rejects this approach as entirely at variance with the phenomena.

With melos firmly established as a musical phenomenon, Aristoxenus must return to the topics of intervals (section XIII) and notes (section XIV) in order to define them in more specific musical terms. But first, in section XII, he introduces the three melodic genera: diatonic, chromatic, and enharmonic. He remarks merely that the diatonic is the oldest and most natural, the chromatic somewhat younger, and the enharmonic the highest and most difficult for the senses. Their intervallic components are gradually specified in the course of section XIII.

Aristoxenus's earlier description of intervals involved five distinctions—magnitude, consonant or dissonant, simple or compound, genus, and rational or irrational—but now, because his focus has been concentrated, he proposes to subsume the first within the second. The smallest consonant interval is a fourth and any consonant interval added to the octave will also be consonant.[46] Building on his earlier observations in section VII about the potentially infinite but practically limited expansion of magnitude, he proposes that the interval of a double-octave-and-a-fifth is the largest range of a human or instrumental voice. Larger intervals, such as the triple or quadruple octave, might be produced if the range were taken from the highest note produced by one instrument or voice to the lowest produced by another,[47] but this does not alter his basic premise that the magnitude of consonant intervals is limited by musical practice: "It is evident from the preceding statements that in the small dimension, the nature of melos gives the fourth as the smallest of the consonant intervals, and in the large dimension, the largest is defined by our capability."[48]

---

[45] Eratocles (fl. fifth century B.C.E.?) is unknown apart from Aristoxenus's references. Aristoxenus also criticizes the formulation of seven octave species in the *Elementa* (see pp. 333–34 *infra*). From at least as early as the sixteenth century, it has been regularly and commonly asserted by scholars that Aristoxenus conceptualized an equally tempered octave, but in fact Aristoxenus's treatises show little interest in the octave, and within the intervals of the fourth and fifth, his system does not exhibit equal temperament. See Malcolm Litchfield, "Aristoxenus and Empiricism: A Reevaluation Based on His Theories," *Journal of Music Theory* 32 (1988): 51–73.

[46] It is important to note that Aristoxenus, although undoubtedly raised within the Pythagorean tradition (see p. 294 *supra*), quite deliberately avoids any of the traditional so-called Pythagorean ratios or explanations for these consonances, and in fact, by observing that consonant intervals added to the octave remain consonant, he is implicitly contradicting the common Pythagorean proof that the interval of an octave-and-a-fourth is dissonant because it cannot be expressed with a multiple or a superparticular ratio. For a fuller discussion of this matter, see p. 325 *infra* and André Barbera, "The Consonant Eleventh and the Expansion of the Musical Tetractys: A Study in Ancient Pythagoreanism," *Journal of Music Theory* 28 (1984): 191–223.

Although the interval of a fifth has been barely mentioned by Aristoxenus to this point, he takes it for granted as one "of the first consonant intervals" (τῶν πρώτων συμφώνων), and by subtracting the interval of a fourth from it, he now produces the whole-tone interval (τὸ τονιαῖον διάστημα). This is then parted into three divisions—the half-tone, third-tone, and quarter-tone—to match respectively the diatonic, chromatic, and enharmonic genera.

Returning to the topic of notes, Aristoxenus proceeds in section XIV to explore them in detail. He begins by relating the interval of a fourth to the "tetrachord," which derives its name from the fact that it contains four notes. Aristoxenus does not draw any special attention to this observation, which may seem self-evident, but it is nevertheless important: if the interval of a fourth were extended over the close-packed diagram of a Harmonicist, it could easily encompass many more than four notes. In associating his smallest consonant interval with the tetrachord, Aristoxenus once again links the more general definition with the more specific musical manifestation and implicitly stresses that consideration of notes must accord with musical phenomena rather than hypothetical possibility.

The tetrachord from hypate to mese is then posited for use in examining each of the genera; Aristoxenus sees no need to define these note-names since they are "so well known to the adherents of music."[49] This tetrachord is chosen because it contains two movable notes—the parhypate and lichanos, which define each genus according to their position—bounded by notes that are immovable—the hypate and mese—and therefore do not change their position from one genus to the next.[50] The lichanos, Aristoxenus proposes, may move over the range of a whole-tone, while the parhypate moves only within the limited range of a diesis, that is, a quarter-tone. The notes can never overlap, "for whenever the parhypate and the lichanos reach the same pitch, the one stretching and the other loosening, there the positions have an end."[51] If the interval between the lichanos and the hypate is smaller than the interval between the lichanos and the mese, the smaller interval is called a pycnon (πυκνόν).

---

[47] For this possibility with respect to the auloi, see pp. 194 and 213–14 *supra*.

[48] ὅτι μὲν οὖν ἐπὶ μὲν τὸ μικρὸν ἡ τοῦ μέλους φύσις αὐτὴ τὸ διὰ τεσσάρων ἐλάχιστον ἀποδίδωσι τῶν συμφώνων, ἐπὶ δὲ τὸ μέγα τῇ ἡμετέρᾳ πως τὸ μέγιστον ὁρίζεται δυνάμει, σχεδὸν δῆλον ἐκ τῶν εἰρημένων (da Rios 27.8–11).

[49] γνωριμωτάτη τοῖς ἁπτομένοις μουσικῆς (da Rios 29.1–2). The precise state of the technical vocabulary—that is, the names of notes and tetrachords and the conception of the Greater, Lesser, and Perfect Immutable Systems—prior to the

With this general outline of the notes in a tetrachord and their relative functions and positions, Aristoxenus quite casually proposes that the interval of a fourth is equivalent to two-and-a-half tones, and then, in a somewhat laborious fashion involving division of the whole-tone into twelve parts, he gradually defines six specific pycna, as illustrated in figure 51. Later theorists may expand the division of the tone into twenty-four parts, express the divisions in terms of ratios instead of parts, or provide somewhat different names for the various pycna, but Aristoxenus's basic design remains the standard for all subsequent theorists who concern themselves with the subject of genera.[52]

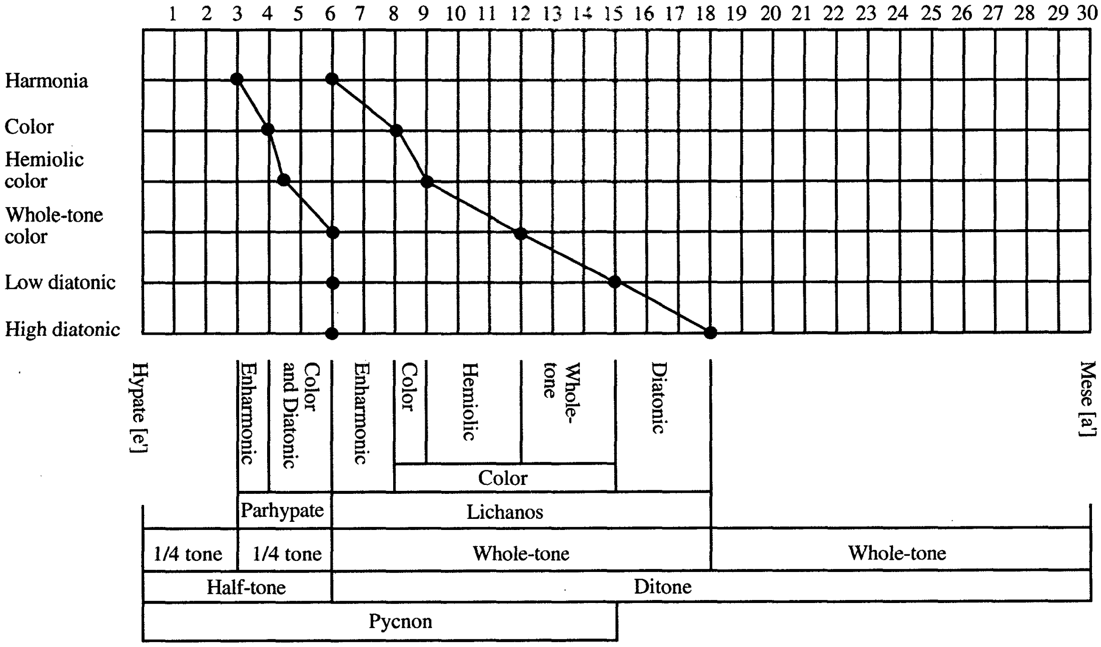
---

time of Aristoxenus is, of course, unknown, but it is probable he could take for granted his audience's acquaintance with much of the basic terminology preserved in the treatise of Cleonides. Readers unfamiliar with this terminology may wish to examine the figure on p. 374 *infra*.

[50] Aristoxenus does not, of course, associate these notes with any specific pitches, but the tetrachord might be conveniently envisioned as the fourth bounded by the pitches e' and a'.

[51] ὅταν γὰρ ἐπὶ τὴν αὐτὴν τάσιν ἀφίκωνται ἥ τε παρυπάτη καὶ ἡ λιχανός, ἡ μὲν ἐπιτεινομένη ἡ δ' ἀνιεμένη, πέρας ἔχουσιν οἱ τόποι (da Rios 30.14–16).

[52] For a useful survey of the genera across the theoretical tradition, see André Barbera, "Arithmetic and Geometric Divisions of the Tetrachord," *Journal of Music Theory* 21 (1977): 294–323.


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Harmonia
Color
Hemiolic color
Whole-tone color
Low diatonic
High diatonic
Hypate [e']
Enharmonic
Color and Diatonic
Enharmonic
Color
Hemiolic
Whole-tone
Diatonic
Color
Mese [a']
Parhypate
Lichanos
1/4 tone
1/4 tone
Whole-tone
Whole-tone
Half-tone
Ditone
Pycnon

Each segment of the grid equals 1/12 of a whole-tone

Figure 51.

After specifying the various positions for lichanoi and parhypatai, Aristoxenus is quick to dispel any implication that these might be six specific and fixed points. Rather, the positions are ranges within which the notes may fall,[53] according to the particular coloration of the music. Thus, the specific points on which lichanoi and parhypatai might fall are potentially unlimited in number.

This conception is extraordinarily bold. All at once, it seems, Aristoxenus casts aside the traditional Pythagorean ratios, with their inherent limitations for illustrating subtle but nonetheless real divisions of musical space, replacing ratios with a fundamentally spatial concept that is perfectly suited to express a range of potential movement. This new conception would be attacked by later theorists and scholars to the present day as empirically faulty and impossible in terms of Pythagorean mathematics, but Aristoxenus did not intend the conception to be empirically or mathematically verifiable: it is, rather, a geometric idealization perfectly in keeping with a treatise *De principiis* in the Aristotelian tradition. In the *Topica* (6.6 [145a15]), Aristotle identifies three types of sciences: poetical, practical, and theoretical. Poetical science deals with phenomena, practical science deals with the actual performance of a task, and theoretical science, highest of the three, transcends the limitations of sensory experience in the exercise of pure reason.[54] As Aristotle defines it in *Metaphysica* 1.1, "the theoretical sciences have more of the nature of wisdom than the poetical; it is evident then that this science is wisdom about certain causes and principles."[55] Although Aristoxenus is concerned with an accurate observation of musical phenomena as the basis for his theory, he makes it clear at the very beginning of *De principiis* that the subject of his study is "first among the theoretical sciences," and later, in the *Elementa*, he observes that "what requires demonstration is not taken as a principle." Thus, the *principia* are intended to be conceptual, not demonstrable.[56]

---

[53] In the *Elementa,* Aristoxenus will refer to each of these as a"shade" (χρόα); in *De principiis,* he uses the term only once in passing, when he states "it is necessary to speak about them [i.e., the positions of the lichanos and parhypate] with respect to their genera and shades" (περὶ δὲ τῶν κατὰ ⟨τὰ⟩ γένη τε καὶ τὰς χρόας λεκτέον [da Rios 30.18–19]).

Aristoxenus's discussion of melos, genera, intervals, and notes in sections XI–XIV departs somewhat from the order of topics proposed in the outline of section II (II/H, J, K, and O), but it forms a logical unfolding of principles. With the establishment of intervallic ranges within which individual notes can mark out the various genera, Aristoxenus quite reasonably turns his attention in section XV to one of the topics so far omitted: continuity and consecution (II/I). Although a departure from the order of the outline, it is difficult to envision how the placement of notes one after another could have been properly treated prior to this point.

Continuity and consecution, as already noted,[57] are closely related to musical logic, or synthesis; the opposite of musical continuity and consecution is the impression conveyed by the closely packed diagrams of the Harmonicists, composed of the smallest possible intervals placed one after another. Such a diagram implies, according to Aristoxenus, that the voice might be expected to sing as many as twenty-eight consecutive dieses, when in fact the voice cannot sing more than two consecutive dieses. He observes that if the voice sings two dieses in ascent, the next interval must be the remainder of a fourth, or "eight times the smallest diesis or smaller by a wholly tiny and unmelodic interval";[58] if the voice sings two dieses in descent, the next interval must be at least as large as a whole-tone. It is important to note that Aristoxenus qualifies this statement by conceding that the remainder of the tetrachord after subtracting the two enharmonic dieses may be slightly smaller than the remaining twenty-four parts (see figure 51). This is, of course, true, and it demonstrates that far from being unaware of the mathematical or empirical problems in his spatial conception, he was acutely aware of them. They do not matter, however: as the interval is musically negligible, it is irrelevant to the theoretical conception.

---

[54] Aristotle *Ethica Nicomachea* 10.7 (1177a12–1178a8).

[55] αἱ δὲ θεωρητικαὶ τῶν ποιητικῶν μᾶλλον. ὅτι μὲν οὖν ἡ σοφία περί τινας αἰτίας καὶ ἀρχάς ἐστιν ἐπιστήμη, δῆλον (Bekker 982a1–3).

[56] πρώτη τῶν θεωρητικῶν (da Rios 5.8); τὸ γάρ πως ἀπαιτοῦν ἀπόδειξιν οὐκ ἔστιν ἀρχοειδές (da Rios 55.3–4). See also pp. 321–22 *infra*. For an excellent assessment of Aristoxenus's conceptual achievement, see Richard Crocker, "Aristoxenus and Greek Mathematics," in *Aspects of Medieval and Renaissance Music: A Birthday Offering to Gustave Reese*, ed. Jan LaRue (New York: W. W. Norton, 1966), 96–110. Litchfield, "Aristoxenus and Empiricism," 51–73, explores the idealism of Aristoxenus and debunks the common notion of Aristoxenus's treatise as a fundamentally empirical compendium.

[57] See pp. 308–9 *supra*.

Aristoxenus does not, of course, mean that the voice could not physically sing more than two dieses in sequence, but rather that the voice cannot sing more notes than exist in the musical sense he has defined. For example, after the hypate, parhypate, and lichanos (the lower three notes of his tetrachord) have been sung in ascent, separated by two enharmonic dieses, the only remaining note is the mese above. If, on the other hand, a second tetrachord were assumed above and the two tetrachords were separated by the tone of disjunction, after the paranete, trite, and paramese had been sung in descent, only the mese of the tetrachord below could follow. Figure 52 may help to illustrate the arrangement.

---

[58] τοῦτο δ' ἐστὶν ἤτοι ὀκταπλάσιον τῆς ἐλαχίστης διέσεως ἢ μικρῷ τινι παντελῶς καὶ ἀμελῳδήπῳ ἔλαττον (da Rios 36.9–11). Andrew Barker (*Greek Musical Writings*, 2:145, n. 17; and "Aristides Quintilianus and Constructions in Early Music Theory," *Classical Quarterly* n.s. 32 [1982]: 184–97) observes that the reference to twenty-eight consecutive dieses is problematic, since there are only twenty-four in the octave. There are, however, several possible explanations. The range between the Hypodorian and Hyperlydian tonoi is an octave and a tone, or in other words, twenty-eight dieses. If a Harmonicist constructed a diagram of the fifteen tonoi accommodating all the possible pitches, it would be in the shape of a wing (such a diagram is described by Aristides Quintilianus *De musica* 1.11) and the two central tetrachords would indeed encompass twenty-eight consecutive dieses. In the *Elementa,* Aristoxenus in fact ascribes just this sort of closely packed diagram to the Harmonicists (see pp. 326–27 *infra*). It might be countered, however, that beginning with Cleonides, later Greek theorists attribute only thirteen tonoi to Aristoxenus, asserting that the two highest tonoi were added by younger theorists. Nevertheless, in the surviving parts of the *Elementa,* Aristoxenus makes no such statement and firmly ascribes to the Harmonicists the naming of the tonoi.

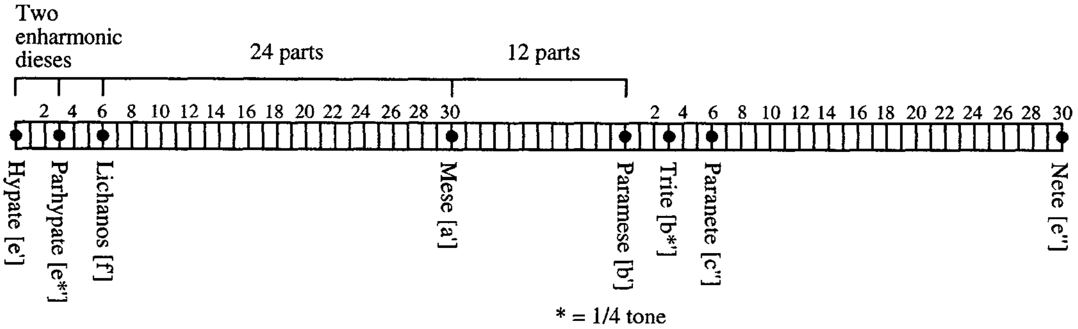

Two enharmonic dieses
24 parts
12 parts
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Hypate [e']
Parhypate [e*']
Lichanos [f']
Mese [a']
Paramese [b']
Trite [b*']
Paranete [c'']
Nete [e'']
* = 1/4 tone

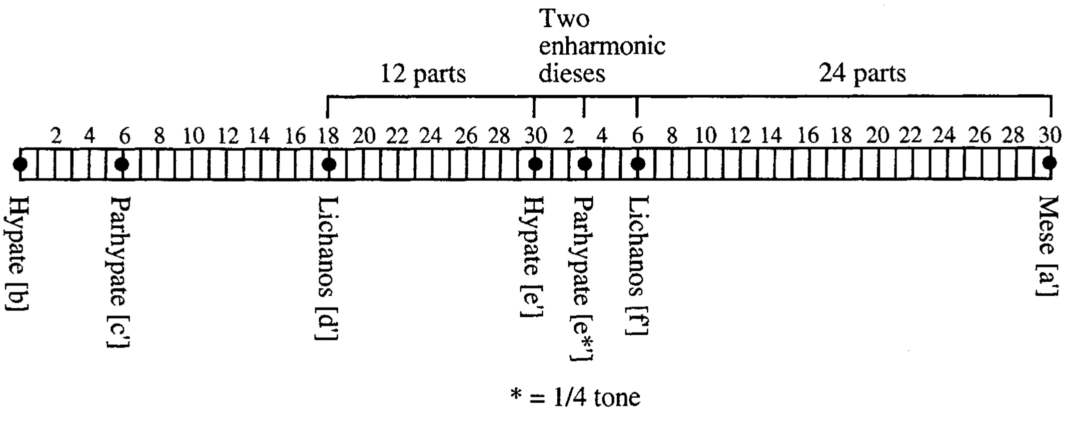
Figure 52.

This single example is, of course, hardly adequate to explain all the possible instances of musical logic. Aristoxenus promises a fuller explication in the *Elementa*.[59]

Having established that intervals cannot simply be strung together without regard for the functional reality of musical notes,

---

[59] "How it [i.e., continuity and consecution] arises and what intervals are or are not placed after what intervals will be shown in the *Elementa*" (πῶς δὲ γίγνεται καὶ τί μετὰ τί διάστημα τίθεταί τε καὶ οὐ τίθεται, ἐν τοῖς στοιχείοις δειχθήσεται [da Rios 37.2–4]). See also p. 297 *supra*. Aristoxenus does not refer to specific notes in formulating his principle, but the following principle of "fourth and fifth notes" makes it clear that figure 52 represents the case he has in mind, though he might not have used these particular note names to describe the upper tetrachord. Even if the two tetrachords were conjunct and used different genera, as in this example:


12 parts
Two enharmonic dieses
24 parts
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Hypate [b]
Parhypate [c']
Lichanos [d']
Hypate [e']
Parhypate [e*']
Lichanos [f']
Mese [a']
* = 1/4 tone

it would still be impossible for the descending interval to be smaller than a whole-tone.

Aristoxenus begins to formulate the larger principle of "fourth and fifth notes." On this principle, either the fourth note in sequence should form the consonance of a fourth, the fifth note should form the consonance of a fifth, or both the fourth and fifth notes should form their respective consonances. A cursory examination of figure 52 will confirm the principle. Although it is not specifically stated, the principle requires that there be no change of genus from tetrachord to tetrachord; if there were, not every fourth or fifth sequential note would produce the required consonance. When such a case occurs, it produces a modulation.[60]

Just as Aristoxenus's treatment of motion and position of the voice echoed Aristotle's *Physica* 3–4, his conception of continuity (συνέχεια) and consecution (ἑξῆς) is clearly derived from *Physica* 5–6. In *Physica* 5.3 (226b34–227a15) in particular, Aristotle provides definitions of ἐφεξῆς (consecution) and συνεχές (continuity) that Aristoxenus can assume as a point of departure in developing his own parallel terminology.[61]

De principiis is truncated in the middle of a series of short postulates and definitions: a consonance formed by one pair of notes and preserved when moving to the next pair of notes indicates that the notes are consecutive; a simple interval in any genus cannot be subdivided; a consonant interval cannot be subdivided into exclusively simple intervals; a sequence is movement through consecutive notes (with the exception of the extremes); and a straight sequence moves in the same direction.[62] It is not clear how much of the treatise may be missing: the outline of section II suggests that only consideration of the perfect scale (II/M), mixing of genera (II/N), and position of the voice (II/P) had yet to be discussed. The first two of these subjects are examined by later theorists, perhaps in terms similar to those Aristoxenus originally employed, but the sense of Aristoxenus's fuller definition of position of the voice is more difficult to reconstruct. He seems to suggest in section II/P that his view of position of the voice would be an alternative for the explanation of the Harmonicists:

---

[60] For a consideration of modulation, see pp. 387–89 *infra*.

[61] For a more detailed consideration of Aristoxenus's debt to Aristotle, see Bélis, *Aristoxène de Tarente et Aristote*.

[62] Aristides Quintilianus *De musica* 1.12 provides a somewhat fuller definition of sequence: a straight sequence moves up by consecutive notes, while a returning sequence moves down by consecutive notes. A revolving sequence, which is used in modulations, ascends through the synemmenon and descends through the diezeugmenon (e.g., a', b♭', c'', d'', e'', d'', c'', b♮', a').

> Since each of the scales placed in a certain position of the voice is sung and ... the melos that arises in it does not acquire just a haphazard difference but nearly the greatest difference, it would be necessary for one taking up the aforesaid study to speak of the position of the voice in general and with respect to each part, inasmuch as is just—that is, only so far and inasmuch as the nature of the scales themselves warrants. Concerning the close relationship between scales and positions and the tonoi, it is necessary to speak looking not towards close-packing as the Harmonicists do but towards the reciprocal melody of the scales, which, as they lie on the tonoi, happen to be sung reciprocally.[63]

Here again, as in so many other definitions, Aristoxenus emphasizes the musical nature of the phenomena. The tonoi, it seems, ought not to be considered an arbitrary series of octaves, separated one from another by some amount and overlaid in a closely packed diagram, but rather a series of vocal positions in which the melodies can be related one to another in musical terms.

With the principles of scales and tonoi thus established, Aristoxenus can now turn his attention to the elements. He is, in fact, conscious of the role of the *Elementa* as a sequential work when he writes near the beginning: "As in every science, this one [i.e., the study of harmonics] was established from many problems, and it is proper that the principles be taken, from which will then be shown the things beyond the principles."[64]

---

[63] ἐπεὶ δὲ τῶν συστημάτων ἕκαστον ἐν τόπῳ τινὶ τῆς φωνῆς τεθὲν μελῳδεῖται καί, ... τὸ γιγνόμενον ἐν αὐτῷ μέλος οὐ τὴν τυχοῦσαν λαμβάνει διαφορὰν ἀλλὰ σχεδὸν τὴν μεγίστην, ἀναγκαῖον ἂν εἴη τῷ τὴν εἰρημένην μεταχειριζομένῳ πραγματείαν περὶ τοῦ τῆς φωνῆς τόπου καθόλου καὶ κατὰ μέρος εἰπεῖν ἐφ' ὅσον ἐστὶ δίκαιον· ἐστὶ δ' ἐπὶ τοσοῦτον ἐφ' ὅσον ἡ τῶν συστημάτων αὐτῶν σημαίνει φύσις. περὶ δὲ συστημάτων καὶ τόπον οἰκειότητος καὶ τῶν τόνων λεκτέον οὐ πρὸς τὴν καταπύκνωσιν βλέποντας καθάπερ οἱ ἁρμονικοὶ ἀλλὰ τὴν πρὸς ἄλληλα μελῳδίαν τῶν συστημάτων οἷς ἐπὶ τίνων τόνων κειμένοις μελῳδεῖσθαι συμβαίνει πρὸς ἄλληλα (da Rios 11.19–12.12). Cf. pp. 302–3 *supra*. Other theorists speak of position of the voice in the same manner: Aristides Quintilianus *De musica* 1.12 and 2.14; Cleonides *Harmonica Introductio* 12; Gaudentius *Harmonica Introductio* 1; Bacchius *Introductio artis musicae* 44; and Bellermann's Anonymous 23, 33–44, and 63–64 (Najock 82.5–8; 94.4–100.8; and 112.5–114.3).

[64] ἐπεὶ δὲ πάσης ἐπιστήμης, ἥ τις ἐκ προβλημάτων πλειόνων συνέστηκεν, ἀρχὰς προσῆκόν ἐστι λαβεῖν ἐξ ὧν δειχθήσεται τὰ μετὰ ἀρχάς (da Rios 54.19–21).

Elementa harmonica

Like *De principiis,* Aristoxenus's *Elementa* exhibits a systematic internal arrangement, and it is the *Elementa* that first articulates the seven categories of harmonics frequently repeated by later Greek theorists: genera, intervals, notes, scales, tonoi, modulation, and melic composition. Many modern scholars have subsequently taken these categories as if they were a standard and universally accepted theoretical model for the Greeks, but in fact Aristoxenus actually frames them within two other categories: hearing and intellect on the one hand and comprehension on the other. Moreover, the order and number of the categories varies in subsequent treatises and some of the later theorists ignore them altogether. Nevertheless, the seven categories build upon the topics of *De principiis* and provide a highly effective means of analyzing musical phenomena.

The following outline shows the order and arrangement of topics, and the parenthetical references once again note the relationship of each section to the overview Aristoxenus provides in section I/B, "Identification of the Study," followed by the relationship to the sections of *De principiis* given in italics. References to the page and line numbers of Rosetta da Rios's edition of the text are provided in brackets.

Aristoxenus, *Elementa harmonica*

Book I

I. Prologue [da Rios 39.4–55.7]
  A. Need for an Outline [da Rios 39.4–41.12]
  B. Identification of the Study [da Rios 41.13–55.7]
    1. general [da Rios 41.13–42.7]
    2. hearing and intellect (ἀκοή, διάνοια) [da Rios 42.8–44.9]
    3. genera (γένη) [da Rios 44.10–45.2]
    4. intervals (διαστήματα) [da Rios 45.3–9]
    5. notes (φθόγγοι) [da Rios 45.10–18]
    6. scales (συστήματα) [da Rios 45.19–46.16]
    7. tonoi (τόνοι) [da Rios 46.17–47.16]
    8. modulation (μεταβολή) [da Rios 47.17–48.3]
    9. melic composition (μελοποιΐα) [da Rios 48.4–10]
    10. comprehension is the value of the study [48.11–55.7]
      a. false comprehension based on instruments

b. true comprehension
  i. the phenomena
  ii. the order
  iii. result and conclusion
II. Genera (B 3, *XII*) [da Rios 55.8–11]
III. Intervals (B 4, *XIII*) [da Rios 55.12–57.12]
  A. Magnitude [da Rios 55.12–56.1]
  B. Consonant, Dissonant [56.1–57.12]
    1. consonant
      a. fourth
      b. fifth
      c. octave
      d. combinations
      e. differences
IV. Notes (B 5, *XIV*) [da Rios 57.13–65.20]
  A. Immovable [da Rios 57.13–16]
  B. Movable [da Rios 57.16–59.17]
    1. lichanos
    2. other
  C. Pycnon and Diatonic Tetrachord [da Rios 59.17–65.20]
    1. harmonic
    2. color
      a. mild
      b. hemiolic
      c. whole-tone
    3. diatonic
      a. mild
      b. intense
V. Scales (B 6, *X*, *XV*) [da Rios 66.1–72.6]
  A. Consecution of Notes
    1. consonant
    2. dissonant
  B. The Fourth
  C. The Fifth

Aristoxenus, *Elementa harmonica*

Book II

I. Scales (B 6 continued) [da Rios 73.4–92.17]
  A. Conjunct, Disjunct [da Rios 73.4–92.5]
    1. consecution
    2. pycnon
    3. ditone
    4. whole-tone
    5. half-tone
    6. combinations
      a. general
      b. diatonic
      c. color and harmonia
  B. Species [da Rios 92.6–17]

In its surviving form, *De principiis* begins with a matter-of-fact tone, albeit somewhat polemical, and proceeds along clearly identifiable Aristotelian lines, but Aristotle himself is never mentioned in the treatise. The *Elementa*, by contrast, is more consciously literary. Section I, the Prologue, begins and ends with the metaphor of the author leading his audience along the road of his discourse. Aristoxenus begins by marking out "the more easily travelled road on which we may march," and at the end, he recalls the metaphor with the caution: "In general, it is necessary to look closely into the establishment of a principle, lest ... in making a sharp turn, we lose many of our friends."[65] Several subjects are framed by this metaphor. First, Aristotle is described relating the story of the bewilderment of Plato's audience when hearing his lectures on the Good.[66] They thought Plato was going to speak about wealth, health, strength—some magical prosperity—but when he actually explained the Good in terms of mathematics, geometry, and astrology, they were angry or disappointed. Aristoxenus observes that Aristotle, learning from this, prefaced his own lectures with an outline, just as Aristoxenus himself has done in *De principiis* and will do in the *Elementa*. Next, Aristoxenus clarifies the value of harmonics: learning is neither sufficient in and of itself to make a musician or improve an individual's ethos, nor is it insignificant and valueless. He states:

> Learning is not properly despised by one who has a mind—and this will become evident as our discourse proceeds—nor is it so much as to be self-sufficient for everything, as some people believe. Many other things, as is always said, belong to the musician, for the study of harmonics is a part of the habit of the musician, just as is the study of rhythmics, metrics, and instruments.[67]

Without referring to the Pythagoreans by name, Aristoxenus clearly distinguishes between his approach, which attempts to "grasp all the phenomenal principles," and the approach of his predecessors, who "speak irrelevantly, ignoring the senses as not being exact, build contrived causes, pretend that there are certain ratios of numbers and reciprocal velocities in which the high and the low arise, and propose considerations totally alien to all things and completely opposite to the phenomena."[68] Aristoxenus, by contrast, will grasp all the phenomena through hearing (ἀκοή) and intellect (διάνοια): the sense of hearing will ascertain characteristics of the phenomena, but intellect will consider their function (δύναμις). Both are essential, Aristoxenus observes, for accurate judgment. In *De principiis,* Aristoxenus employed the spatial conceptions of geometry for some of his explanations of intervals and the genera, and here, he observes that the geometer—unlike the carpenter, turner, or other artisans—does not use his senses to judge the accuracy of a line or shape. Nevertheless, for the musician, Aristoxenus thinks accuracy of the senses occupies "nearly the rank of a principle."[69] Only sensitive hearing can convey to the intellect different positions and durations of the movable and immovable notes. Still, it is the intellect that determines the functions of various magnitudes, intervallic and rhythmic.

---

[65] ὥσπερ ὁδὸν ᾗ βαδιστέον ῥᾴδιον πορευώμεθα (da Rios 39.5–6); καθόλου δ' ἐν τῷ ἄρχεσθαι παρατηρητέον, ὅπως μήτ' ... αὖ κάμπτοντες ἐντὸς πολλὰ τῶν οἰκείων ἀπολιμπάνωμεν (da Rios 55.4–7).

[66] It is not certain which, if any, specific work Aristotle may have had in mind, since Plato develops the notion of the Good over several works. See Julián Marías, *History of Philosophy*, trans. Stanley Applebaum and Clarence C. Strowbridge (New York: Dover, 1967), 52–53.

[67] οὐδέτερον δὲ τούτων ἀληθές ἐστιν, οὔτε γὰρ εὐκαταφρόνητόν ἐστί τινι ὃς νοῦν ἔχει τὸ μάθημα—δῆλον δ' ἔσται προϊόντος τοῦ λόγου—, οὔτε τηλικοῦτον ὥστ' αὔταρκες εἶναι πρὸς πάντα, καθάπερ οἴονταί τινες. πολλὰ γὰρ δὴ καὶ ἕτερα ὑπάρχει [ἤ], καθάπερ ἀεὶ λέγεται, τῷ μουσικῷ· μέρος γάρ ἐστιν ἡ ἁρμονικὴ πραγματεία τῆς τοῦ μουσικοῦ ἕξεως, καθάπερ ἥ τε ῥυθμικὴ καὶ ἡ μετρικὴ καὶ ἡ ὀργανική (da Rios 41.4–11).

[68] ἡμεῖς δ' ἀρχάς τε πειρώμεθα λαβεῖν φαινομένας ἁπάσας (da Rios 42.5–6); οἱ μὲν ἀλλοτριολογοῦντες καὶ τὴν μὲν αἴσθησιν ἐκκλίνοντες ὡς οὖσαν οὐκ ἀκριβῆ,

These observations lead Aristoxenus to enumerate his famous seven categories, and he notes in each case that earlier treatments have been inadequate, mistaken, or non-existent. When he speaks of the tonoi, he once again takes exception to the Harmonicists by name, implying that their identification of a series of tonoi separated by some small interval results simply in a closely packed diagram and not in any useful understanding of musical phenomena. Some of the Harmonicists arranged the tonoi in the ascending order of Hypodorian, Mixolydian, Dorian, Phrygian, and Lydian, with the first three separated from each other by a half-tone and the final three by a tone. Others, however, who base their assumptions on the aulos think that the ascending order should be Hypophrygian, Hypodorian, Dorian, Phrygian, Lydian, and Mixolydian, with the first three separated from each other by three dieses, the Dorian and the Phrygian by a tone, and the last three once again by three dieses.[70] But this account "is like the

---

νοητὰς δὲ κατασκευάζοντες αἰτίας καὶ φάσκοντες λόγους δέ τινας ἀριθμῶν εἶναι καὶ τάχη πρὸς ἄλληλα ἐν οἷς τό τε ὀξὺ καὶ τὸ βαρὺ γίγνεται, πάντων ἀλλοτριωτάτους λόγους λέγοντες καὶ ἐναντιωτάτους τοῖς φαινομένοις (da Rios 41.19–42.3). On Aristoxenus's concern with sensory perception, see Andrew Barker, "Music and Perception: A Study in Aristoxenus," *Journal of Hellenic Studies* 98 (1978): 9–16.

[69] σχεδόν ἐστιν ἀρχῆς ἔχουσα τάξιν (da Rios 42.21–22).

[70] On Aristoxenus's remarks about the aulos, see chapter 3, pp. 194 and 213–15 *supra*.

sequence of days: when the Corinthians observe the tenth day, the Athenians observe the fifth, and others the eighth."[71]

Aristoxenus concludes his Prologue with a long and difficult consideration of musical comprehension (ἡ τῆς μουσικῆς ξύνεσις). Music is a phenomenon passing through time, not a frozen moment in time; thus, it is both a Becoming (τὸ γιγνόμενον) and a Having Become (τὸ γεγονός). In order to comprehend music, one must have sense (αἴσθησις) of the Becoming and memory (μνήμη) of the Having Become. Even two thousand years later, such an explanation of the phenomenon of music seems very modern, and it is in marked contrast to the purely systematic descriptions of the Harmonicists and the mathematical descriptions of the Pythagoreans. Aristoxenus mentions neither group in this brief formulation, but his subsequent argument makes it clear that he has the Harmonicists at least in mind.

For Aristoxenus, all the individual and technical details of music are merely manifestations that lead to comprehension. He observes: "It will happen that we completely miss the truth when we do not make judgment the end and sovereign but rather the subject of judgment the sovereign and end." The Harmonicists, he asserts, "have it backwards when they think that placing some apparent thing is the end of comprehension, for comprehension is the end of every visible thing."[72] Musical notation and the characteristics of the aulos—two apparent preoccupations of the Harmonicists—have no place in the study of harmonics. Notation simply tells the reader the size of the various intervals but nothing about the function of the intervals or the notes that form them. Aristoxenus concedes that notation may make it easier for amateurs to see something of the nature of music, but this is not the aim of harmonics. Likewise, the aulos is merely a medium through which the nature of music is expressed under the control of the senses; neither it nor any other instrument is an embodiment of that nature.

---

[71] ἔοικε τῇ τῶν ἡμερῶν ἀγωγῇ ... οἷον ὅταν Κορίνθιοι μὲν δεκάτην ἄγωσιν Ἀθηναῖοι δὲ πέμπτην ἕτεροι δέ τινες ὀγδόην (da Rios 46.20–47.1). Cf. pp. 314–15 *supra*.

[72] διημαρτηκέναι γὰρ συμβήσεται τἀληθοῦς, ἐὰν τὸ μὲν κρῖνον μήτε πέρας μήτε κύριον ποιῶμεν, τὸ δὲ κρινόμενον κύριόν τε καὶ πέρας (da Rios 52.1–4); ἔπειθ' ὅτι ⟨πέρας⟩ τοῦ ξυνιέναι τιθέντες φανερόν τι ἔργον ὡς οἴονται ἀνάπαλιν τιθέασιν· παντὸς γὰρ ὀφθαλμοφανοῦς ἔργου πέρας ἐστὶν ἡ ξύνεσις (da Rios 51.10–13). For a discussion of Aristoxenus's sense of "comprehension," see Flora R. Levin, "*Synesis* in Aristoxenian Theory," *Transactions of the American Philological Association* 103 (1972): 211–34.

With this, Aristoxenus is ready to close his prologue and begin specific investigation of the elements. He reminds his audience that the phenomena must be correctly understood, the sequence of phenomenal events correctly discriminated, and a result and conclusion estimated. Then, recalling his opening metaphor, he cautions that the elements must be carefully identified, "lest, in making a sharp turn, we lose many of our friends."[73]

The balance of Book I of the *Elementa* is devoted to the topics of genera, intervals, notes, and scales. Much of this material is simply an elaboration of the definitions in *De principiis*.

In connection with the genera (section II), Aristoxenus once again uses the terms he employed in section XIV of *De principiis* to identify the three types of melos as diatonic, color, and harmonia,[74] but he now adds that melos can also be a mixture of these or common to all of them. He had alluded to this point in section II/N of *De principiis* when criticizing the inadequacy of the Harmonicists,[75] but there is no elaboration in any of the surviving sections of the *Elementa*. Aristides Quintilianus's *De musica* 1.12, however, does refer to "choice" (λῆψις), "mixing" (μίξις), and "usage" (χρῆσις) as the three parts of melic and rhythmic composition. For melic composition, he defines mixing as the arrangement of notes, positions of the voice, genera, and scales; for rhythmic composition, as the combination of rhythms. No doubt a melos exhibiting a mixture of genera was one that involved a modulation of genus—one of the types of modulation specified in several of the treatises—and a melos common to the genera was one using only notes that might be interpreted in any of the genera.[76]

In section III, turning his attention to intervals, Aristoxenus recalls the first two distinctions of *De principiis*: by magnitude and by consonance or dissonance. As the two distinctions were consolidated in *De principiis*, section XIII, Aristoxenus now simply states that there are eight magnitudes of consonance; all other intervals are dissonant. Only the first three magnitudes, however, are actually named: the fourth, the fifth, and the octave. In *De principiis*, Aristoxenus had proposed that any consonant interval added to an octave produced a larger consonant interval, and the proposition is repeated here, with the acknowledgment that he differs on this matter from his predecessors—certainly an oblique reference to the Pythagoreans.[77] Thus, the remaining intervals must be the octave-and-a-fourth, octave-and-a-fifth, double octave, double-octave-and-a-fourth, and double-octave-and-a-fifth—exactly the interval earlier identified by Aristoxenus as the practical limit of the human or instrumental voice.

---

[73] μητ' αὖ κάμπτοντες ἐντὸς πολλὰ τῶν οἰκείων ἀπολιμπάνωμεν (da Rios 55.6–7). On this passage, see also pp. 298 and 320–21 *supra*.

[74] Although in section XII of *De principiis*, he used the more familiar adjectival forms "chromatic" and "enharmonic."

[75] See pp. 317–18 *supra*.

[76] On modulation, see pp. 387–89 *infra*.

As a transition between section III on intervals and section IV on notes, Aristoxenus recalls a number of the striking definitions of *De principiis*, section XIV: the fifth exceeds the fourth by a tone, the fourth equals two-and-a-half tones, and the tone may be parted into half-tones, third-tones (the smallest chromatic diesis), and quarter-tones (the smallest enharmonic diesis).[78] Without specifically referring to it, he then reminds his audience of the important principle of continuity and consecution: even though a tone may be separated into certain small parts, it does not follow that all these parts may be sung consecutively one after another.

The discussion of notes in section IV is based on the same typical tetrachord—bounded by hypate and mese—employed in *De principiis*, and although there are some slight differences in the terms applied to them, the pycnon and the various shades of the tetrachord are defined in a manner equivalent to the definitions of *De principiis*.[79] A large portion of the section, however, is devoted to a refutation of an unattributed earlier argument, the thrust of which seems to have been this: if the lichanos and parhypate move within the tetrachord and therefore define intervals of varying size, these two notes should also have a variety of names because intervals should be defined by one and only one pair of names. Aristoxenus points out that many different notes may bound the interval of a fifth—as, for example, nete and mese, paranete and lichanos, trite and parhypate, and paramese and hypate[80]—and if it were necessary to have different names for every possible interval, an infinite number of names would be required. But the argument fails in and of itself, Aristoxenus observes, because "nothing of this is in accord with the display of the sense" and "to assume either that equal intervals be bounded by the same names or that unequal intervals be bounded by other names is to do battle with the phenomena." Rather, "each of the genera moves with a motion unique to the sense," and while the magnitudes of the intervals are not the same in each shade, "the species of the tetrachord is the same."[81]

---

[77] See p. 310 *supra*.

[78] See pp. 312–13 *supra*. Aristoxenus does not defend his proposition that the fourth equals two-and-a-half tones until he turns to a systematic demonstration of the interval in section V/B (pp. 327–29 *infra*).

[79] See figure 51 on p. 313. In the *Elementa*, Aristoxenus calls the harmonia "enharmonic" (ἐναρμόνιος), the lowest shade of the color "mild color" (μαλακὸν χρῶμα) and the low and high diatonic "mild and intense" (μαλακὸν διάτονον, σύντονον διάτονον). The intervallic dimensions, however, are identical.

Once again, Aristoxenus's counter-argument seems very modern: the ear detects the unique functional quality of a genus, from which the intellect is able to conclude the species of the tetrachord. This judgment has everything to do with the dynamic context of the music and nothing to do with the names of the notes or the sizes of the intervals.

Having dispensed with the opposing position, Aristoxenus again describes the pycnon and each of the shades. He concludes section IV with a further point not made in *De principiis*. Although the parhypatai and lichanoi move within certain ranges, this movement must always be proportional: the interval between the hypate and parhypate must never be greater than that between the parhypate and the lichanos.

Book I of the *Elementa harmonica* closes with a discussion of scales. In *De principiis*, Aristoxenus stressed that the closely packed "scales" of the Harmonicists did not accord with musical logic because they ignored the principles of synthesis and continuity and consecution. He therefore begins his discussion of scales in the *Elementa* by reviewing these principles, once again stressing that definitions must always follow "the nature of melos" (ἡ τοῦ μέλους φύσις). The language of the *Elementa* of course contrasts with the explanations in *De principiis,* but the same principles are stated: an infinite number of notes cannot simply be strung together; and if a melos ascends or descends, the intervals formed by notes separated by four or five consecutive degrees in the scale must form the consonant intervals of a fourth or a fifth.[82]

---

[80] Keeping in mind that none of the notes in the Greek system can ever be defined as having a certain fixed pitch, these fifths could be envisioned as e''–a', d''–g', c''–f', and b'–e'.

[81] οὐδὲν τούτων ἐστὶ πρὸς τὴν τῆς αἰσθήσεως φαντασίαν (da Rios 60.7–8); τὸ δ' ἀξιοῦν ἢ τὰ ἴσα διαστήματα τοῖς αὐτοῖς ὀνόμασιν ὁρίζεσθαι ἢ τὰ ἄνισα ἑτέροις μάχεσθαι τοῖς φαινομένοις ἐστί (da Rios 62.1–3); ἰδίαν γὰρ δὴ κίνησιν ἕκαστον τῶν γενῶν κινεῖται πρὸς τὴν αἴσθησιν (da Rios 60.15–16); τὸ δ' εἶδος τοῦ τετραχόρδου ταὐτό (da Rios 61.11–12).

Aristoxenus has thus far been content to define dissonant intervals simply as all those that are not consonant, but now he observes that the limited number of consonances are much more easily identified by the senses than are all the different types of dissonant intervals. Nevertheless, the senses can produce and identify specific dissonant intervals by means of consonance. Aristoxenus is most interested in the ditone and the small interval that represents the difference between the fourth and the ditone[83] because, as these are the principal dissonant intervals within the tetrachord, they are the most important in actual musical phenomena. He first proceeds to demonstrate the location of a ditone through the use of ascending and descending fourths and fifths. No notes are named because the procedure can be applied at any point. If, for example, one moved through the sequence e'–a'–d'–g'–c', the ditone e'–c' would be determined. Likewise, the small dissonant interval that represents the excess of a fourth over a ditone can be measured and identified by positing, for example, the fourth e'–a' and moving through the sequence a'–d''–g'–c''–f' to produce the half-tone e'–f'.

Such a demonstration in a discussion of scales may at first seem incongruous, but Aristoxenus intends to use these dissonant intervals as part of the explanation of his smallest scale, the tetrachord. On two earlier occasions (*De principiis,* section XIV; *Elementa,* section III), he casually asserted that the interval of the tetrachord, the fourth, equals two-and-a-half tones. Recognizing that this assertion cannot be supported by Pythagorean mathematics and quite correctly anticipating criticism on this point from subsequent theorists, he applies the technique of the preceding demonstration as an explanation, given entirely in prose, without the aid of any note names, diagrams, or symbols. Nevertheless, figure 53 can be easily constructed as an illustration of his argument.

---

[82] See pp. 308–10 and 314–16 (especially figure 52) *supra.*

[83] For Aristoxenus, the ditone is equivalent to two whole-tones; for the Pythagoreans, it is expressed as the ratio 81:64. The excess of the fourth over the ditone is commonly called the "leimma" in Pythagorean treatises, expressed by the ratio 256:243; for Aristoxenus, it is a "half"-tone.

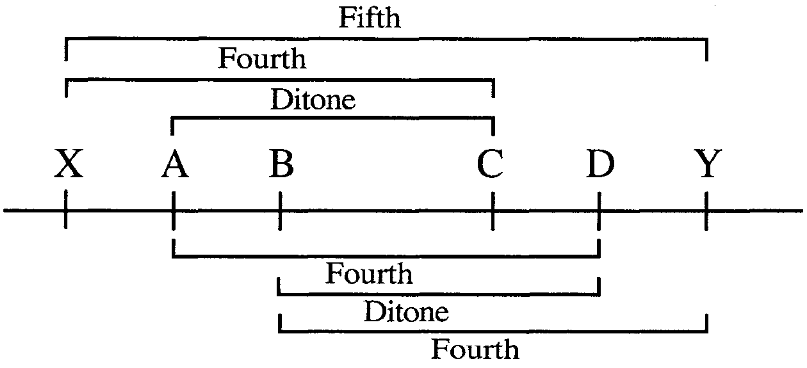


Figure 53.

First, the interval of a fourth, A–D, is hypothesized, and then, one ditone B–D is located below D, the upper pitch of the fourth, while a second ditone A–C is located above A, the lower pitch of the fourth. The remainders A–B and C–D must be equal excesses of the fourth over the ditone because the ditones are equal. A second set of fourths, X–C and B–Y, is then taken by consonance, and the excesses X–A and D–Y must be equal because they have been produced by equal extensions in opposite directions. The large interval, X–Y, that now results must be evaluated by sense. If the result is dissonant, the fourth is not equal to two-and-a-half tones, but if it is adjudged to be a fifth, the fourth must be equal to two-and-a-half tones, Aristoxenus argues, for the following reason. By definition (section III/B), a fifth is larger than a fourth by one whole-tone; as the excesses of a fifth over a fourth, X–B and C–Y are whole-tones; X–A, A–B, C–D, and D–Y are equal because in every case they represent the excess of a fourth over a ditone, which is, by the preceding demonstration, equal to two whole-tones; the whole-tones X–B and C–Y are divided into the equal half-tones, X–A, A–B, C–D, and D–Y; therefore, the fourth equals two-and-a-half tones. Anticipating questions about the initial condition, Aristoxenus notes that the interval X–Y cannot be a fourth because it is the result of extension in both directions beyond the initial dimension of a fourth; as the extensions X–A and D–Y were less than a tone, it is evident that the sum cannot be as large as an octave; the only consonant magnitude between the fourth and the octave is the fifth; therefore, if the interval X–Y is consonant, it must be a fifth.

Objections to Aristoxenus's demonstration can be raised on various mathematical grounds, some of which appear in the Euclidean *Sectio canonis* and the treatises of Theon of Smyrna, Ptolemy, and Boethius. Aristoxenus, by background and training, would certainly have been aware of these objections, but here, as elsewhere in *De principiis* and the *Elementa*, his demonstration is neither mathematical nor empirical. Rather, it is cast in a totally new spatial logic that mathematical objections cannot address, and although it is possible to test the demonstration on a monochord with reasonable results, the empirical validity is less important than the demonstration's conceptual idealization.[84]

At this point in the surviving manuscript sources, the "first book" of the *Elementa* ends. There may have been additional material, but it is also possible that the *Elementa* continues without a break in the "second book."[85] In any case, the "second book" does continue the discussion of scales, with particular emphasis on various types of conjunction and disjunction.

Expanding his view beyond the single tetrachord and building on the earlier principles of consecution and synthesis, Aristoxenus observes that consecutive tetrachords may be either conjunct or disjunct. Conjunct tetrachords share a common note in the middle (e.g., e'–f'–g'–a' and a'–b♭'–c''–d''); disjunct tetrachords are separated by a tone (e.g., e'–f'–g'–a' and b'–c''-d''-e''). On the principle of "fourth and fifth notes," if fourth consecutive notes produce the interval of a fourth, the tetrachords are conjunct, while if fifth consecutive notes produce the interval of a fifth, the tetrachords are disjunct.

Seemingly conscious of some debate about these two possible structures for consecutive tetrachords,[86] Aristoxenus adds that scales formed of conjunct tetrachords are common by position and necessarily similar, while scales formed of disjunct tetrachords are separated from one another and **may** have similar species of tetrachords.[87] In order for tetrachords to be considered consecutive, there must either be no tetrachord between them, or if there is an intervening tetrachord between tetrachords of similar species, it must not be dissimilar. In this case, all three tetrachords would form a consecutive scale. On the other hand, if two hypothetical tetrachords were dissimilar but consecutive, no tetrachord at all could be placed between them. Aristoxenus does not give specific examples, but it is easy to see that the principle of "fourth and fifth notes" requires either that the pattern of the tetrachords remain the same if there are more than two or that tetrachords of dissimilar species be immediately adjacent.[88]

---

[84] On this famous demonstration, see Litchfield, "Aristoxenus and Empiricism," 61–65; see also pp. 313–14 *supra*.

[85] See pp. 295–99 *supra* for a discussion of the structure of Aristoxenus's *Harmonica* in the surviving sources.

[86] He states: "Some of my listeners have been in doubt about consecution" ("Ηδη δέ τις ἠπόρησε τῶν ἀκουόντων περὶ τοῦ ἑξῆς [da Rios 74.3]).

In his earlier discussions of synthesis, continuity, and consecution, Aristoxenus has stressed that notes can only be placed and identified according to musical logic. Now, as he begins to define more complex scales, he reminds his audience that an interval such as a tone or ditone is not simple or complex by definition but rather by its place within the musical system. The ditone, for example, may be either simple or complex. When there is a potential intervening note, as in the ditone formed by the mese and the parhypate in the diatonic genus (e.g., a'–f'), it is complex; the lichanos (g') could have divided this interval. When there is not, as in the same ditone formed by the mese and the lichanos in the enharmonic genus, it is simple; there is no note between the mese and the lichanos. Likewise, the half-tone between the parhypate and the hypate (e.g., f'–e') in the diatonic genus is simple because there is no note between parhypate and hypate, but the same half-tone between the lichanos and the hypate in the enharmonic genus is complex because the parhypate (e*') could intervene.

One unique interval, however, is the "tone of disjunction" in scales comprised of disjunct tetrachords, and Aristoxenus recognizes that its function has not yet been defined. He minimizes its importance: since this tone is bound on either side by immovable notes of the upper and lower tetrachords, it is not actually a part of either of them, and it therefore plays no role in the definition of the various genera. It can, however, be considered as an expansion of the tetrachord, and thus it has some impact on Aristoxenus's next subject: the potential intervallic progressions in each genus.

---

[87] Barker (*Greek Musical Writings*, 2:171, n. 5) thinks that Aristoxenus cannot mean to limit the "tetrachords" to those bounded by immovable notes, but in fact Aristoxenus has been very careful to differentiate between the interval of a fourth, which may be bounded by numerous pairs of notes, and tetrachords proper, which are always bounded by immovable notes.

[88] For an example of a pair of tetrachords of dissimilar species that nevertheless adheres to the principle of "fourth and fifth notes," see n. 59 *supra*.

If intervals can only be divided according to their place in the musical system, it follows that they can only be compounded in the same manner. In most of the balance of this "second book" of the *Elementa*, Aristoxenus provides detailed explanations of many of the possible logical progressions. The progressions prohibited on the principles of synthesis and "fourth and fifth notes" are most easily stated, but in addition, Aristoxenus provides a number (but by no means all) of the approved progressions. These can be easily summarized in the following table.

Interval	**Diatonic**	**Chromatic and enharmonic**[89]
Pycnon	Does not exist.	Two consecutive pycna may not occur in ascent or descent. A ditone may precede or follow in ascent or descent. A tone may follow only in descent.
Ditone	Does not exist as a simple interval.	Two consecutive ditones may not occur in ascent or descent. A pycnon may precede or follow in ascent or descent. A tone may follow only in ascent.
Whole-tone	No more than three consecutive whole-tones may occur. A semitone may not both precede and follow.	Two consecutive whole-tones may not occur in ascent or descent. A ditone may follow in descent, a pycnon in ascent.
Semitone	Two consecutive semitones may not occur in ascent or descent. A whole-tone may precede or follow.	No more than two consecutive dieses may occur in ascent or descent.

---

[89] In the chromatic genus, "the interval from the mese to the lichanos is substituted for the ditone and the interval results according to each shade and the magnitude of the pycnon" (Ὁμοίως δ' ἕξει καὶ ἐπὶ τῶν χρωμάτων πλὴν τό τε μέσης καὶ λιχανοῦ διάστημα μεταλαμβάνεται ἀντὶ διτόνου τὸ γιγνόμενον καθ' ἑκάστην χρόαν καὶ τὸ τοῦ πυκνοῦ μέγεθος [da Rios 85.1–4]).

In formulating such a detailed set of progressions, Aristoxenus anticipates the objection that the size of the intervals within the pycnon and the remainder of the fourth vary according to the shade of the genus. While noting that these progressions might be perceived as "unlimited roads" (ἄπειροι ὁδοί), he reminds his audience that "with respect to the magnitudes of intervals and the pitches of notes, it does appear that these are infinite in melos, but with respect to functions, species, and placements, these are finite and organized things."[90] The progressions are a matter of dynamic movement rather than static linking of certain intervallic magnitudes. To emphasize this point, he restates most of his progressions as a series of "roads" leading to and from the various **notes** of the pycnon, thereby stressing the functional progression from one note to another. Along the way, the precise structure and function of the pycnon itself are also elaborated.

With the "infinite magnitudes of intervals" in mind, Aristoxenus attempts to generalize the three genera by considering the number of possible different intervals in each when the tone of disjunction is added to the generic tetrachord.[91] In its highest shade, the diatonic genus might have only two different intervals, tone and half-tone, but as the parhypate moves downwards, there would be three intervals, two equal and two unequal. When the lichanos moves downwards, four unequal intervals would result. Only in the diatonic can there be three consecutive simple intervals—the whole-tone—thus only the diatonic can have as few as two different intervals. The chromatic and the enharmonic genera would always have at least three different intervals: the tone, the interval larger than a tone that exists between the upper note of the tetrachord and the upper note of the pycnon, and the intervals within the pycnon. They could, however, have four different intervals if the intervals in the pycnon were unequal.

---

[90] κατὰ μὲν οὖν τὰ μεγέθη τῶν διαστημάτων καὶ τὰς τῶν φθόγγων τάσεις ἄπειρά πως φαίνεται εἶναι τὰ περὶ μέλος, κατὰ δὲ τὰς δυνάμεις καὶ κατὰ τὰ εἴδη καὶ κατὰ τὰς θέσεις πεπερασμένα τε καὶ τεταγμένα (da Rios 86.8–12). Andrew Barker provides a detailed examination of the various progressions in "Aristoxenus' Theorems and the Foundations of Harmonic Science," *Ancient Philosophy* 4 (1984): 23–64.

[91] Figure 51 provides a clear illustration of the sizes of the intervals in the six basic shades. At this point, however, Aristoxenus goes beyond these six shades in considering the notes of the pycnon as infinitely variable.

On the surface, this section of the *Elementa* seems to stress and belabor the obvious, but in fact Aristoxenus is developing a very sophisticated point. In a piece of music, the character of the genera is not perceived in a particular order of specific intervals arranged sequentially in a static scale; it is perceived in characteristic dynamic progressions of intervals, or "roads," that differ in ascent and descent. These dynamic progressions are readily recognizable, regardless of the notes that unfold them and even though the exact sizes of the intervals may vary from piece to piece. In order to convey the characteristic quality of the genera, the theorist does not need to specify every possible note and interval but rather the relative sizes of intervals and their typical patterns of succession. So, Aristoxenus is able to reduce the infinite number of possible arrangements to a manageable series of archetypal genera.[92]

The final surviving section of the *Elementa* explores the various "species" (εἶδος) of the scales, beginning with the species of the fourth. Any scale may have its intervals conceptualized in various orders, and each of these would constitute a species of that scale. In the case of the fourth, Aristoxenus defines three species: first, with the pycnon at the bottom and the ditone at the top; second, with the ditone in the middle, one interval of the pycnon on the bottom, and the other on the top; and third, with the pycnon at the top. Although it is not specified in his description, these species assume a pycnon divided into equal intervals.[93]

It would appear that Aristoxenus must have proceeded to identify species of the fifth and the octave, continuing perhaps with a discussion of the Greater and Lesser Perfect Systems. He suggests in the outline of *De principiis* (section II/M) that these subjects had been inadequately treated by Eratocles, and in the outline of the *Elementa* (section I/B/6), he criticizes the followers of Pythagoras of Zacynthos and Agenor of Mytilene for limiting their examination to only some of the possible species.[94] Nevertheless, Aristoxenus does not say he intends to examine species of the fifth and the octave, and it is clear throughout the *Harmonica* that he considers the fourth to be the principal subject for examination. The outline of the *Elementa* does, however, certainly suggest that the treatise must have originally included—or must have been intended to include—treatments of tonoi, modulation, and melic composition. These subjects do appear in later treatises, but it is regrettable that they do not survive in Aristoxenus's own penetrating formulations.[95]

---

[92] All of this, of course, is a further instance of Aristoxenus's debt to Aristotle's system of definition and classification, especially as it appears in the *Categoriae* and *Metaphysica*.

[93] In this section, Aristoxenus seems to anticipate some question about his use of the term εἶδος and asserts that in his usage, it is synonymous with σχῆμα (form), a term he has used in similar contexts on a number of earlier occasions. For a thorough examination of the species in Greek theoretical writings, see Barbera, "Octave Species," 229–41.

Even in its fragmentary state, Aristoxenus's *Harmonica* is an extraordinary work. As Aristoxenus seems to have anticipated, later theorists would criticize various aspects of his demonstrations, especially those that challenged the traditional laws of Pythagorean mathematics, or missing his larger conceptual aims, would reduce his system to a series of simple descriptions. A theorist such as Cleonides, for example, would construct a virtual epitome of the "Aristoxenian" system, while one such as Claudius Ptolemy would preserve and advance a system strongly reminiscent of the Harmonicists. None of the later theorists—Greek or Latin—seems to have realized Aristoxenus's strikingly modern conceptual base and undertaken to develop it.

Rhythmica

The treatise commonly known today as the *Elementa rhythmica* is clearly but a small fragment of Aristoxenus's original treatment, and unlike the *Harmonica*, it is preserved in only three manuscripts. The earliest of these, Venetus Marcianus gr. app. cl. VI/3, dating from the twelfth century and the earliest source for the *Harmonica* as well, presents the treatise as the "second book" of Aristoxenus's *Elementa rhythmica* (Ἀριστοξένου ῥυθμικῶν στοιχείων. δεύτερον). This text, as it survives today, is truncated after only four folios by the end of the manuscript on f. 95v; an early annotation in the lower margin notes that a hundred following folios are missing. While the annotation certainly does not mean that the balance of the *Elementa rhythmica* occupied one hundred folios, a thirteenth-century source, Vaticanus gr. 191, which is indirectly related to the earlier codex, does preserve a bit more of the text. The third codex, Vaticanus Urbinas gr. 77, dating from the sixteenth century, preserves the same amount of text as found in Vaticanus gr. 191 but titles it the "third book" of the *Elementa rhythmica*.[96]

---

[94] Cf. pp. 309–10 *supra*.

[95] The very short fragment "On tonoi" preserved in Porphyrius's commentary to Ptolemy's *Harmonica* 1.4 may derive from this section. It, however, simply states that while there are an infinite number of theoretical pitches within the fourth (since the intervals constituting the fourth can be divided infinitely), in terms of musical logic, there are only six. This is perhaps a reference to the six shades of the three genera.

As conjectured earlier in this chapter, something of the content—if not the style—of missing sections of the *Harmonica* can perhaps be reconstructed from later theoretical sources, and this may be equally true for the *Rhythmica*. Several sources are of particular importance: an extended excerpt "On the protos chronos" (Περὶ τοῦ πρώτου χρόνου) directly attributed to Aristoxenus in Porphyrius's commentary on Ptolemy's *Harmonica* 1.4; the sections on rhythmics and metrics in Aristides Quintilianus's *De musica*; fragments 9 and 2687 of the Oxyrhynchus Papyri; the so-called *Excerpta Neapolitana*; and a short introduction to rhythmics (Προλαμβανόμενα εἰς τὴν ῥυθμικὴν ἐπιστήμην) by the eleventh-century Byzantine scholar Michael Psellus. These sources will be drawn into the discussion on the following pages.[97]

---

[96] For fuller descriptions of these manuscripts, see Mathiesen, *RISM BXI*, **214**, **255**, and **270**. Lionel Pearson suggests on pp. xi–xii of his edition and translation of the *Elementa rhythmica* (see chapter 2, n. 43) that the three manuscripts were copied one from another in chronological order, but the actual process is much more complex than that. On these manuscripts and the problem of their relationship, see Mathiesen, "Ars critica and Fata libellorum: The Significance of Codicology to Text Critical Theory," in *Music Theory and Its Sources: Antiquity and the Middle Ages*, ed. André Barbera (Notre Dame, Ind.: Notre Dame University Press, 1990), 19–37 (especially pp. 34–35); idem, "Aristides Quintilianus and the *Harmonics* of Manuel Bryennius," 31–47; idem, "Hermes or Clio?"; and Barbera, "Reconstructing Lost Byzantine Sources," 38–67.

[97] Both Aristides Quintilianus and Psellus will be considered separately in chapters 6 and 7. For Porphyrius's excerpt, see the text in Düring 78.23–79.28 (reprinted, with English translation, in Pearson, *Elementa rhythmica*, 32–35); for Aristides Quintilianus *De musica* 1.13–29, see the text in W.–I. 31.3–52.23 (English translation in Mathiesen, *AQ on Music*, 94–113); and for the Oxyrhynchus Papyri, see B. P. Grenfell and A. S. Hunt, "IX. Aristoxenus ΡΥΘΜΙΚΑ ϹΤΟΙΧΕΙΑ," *Oxyrhynchus Papyri* 1 (1898): 14–21 and plate III; J. R. Rea, "2687. Aristoxenus, Ῥυθμικὰ Ϲτοιχεῖα?" *Oxyrhynchus Papyri* 49 (1968): 15–25 (a photo-

At the beginning of the "second book" of the *Elementa rhythmica,* Aristoxenus refers to a preceding discussion in which he observed that there are many natures of rhythm (ὅτι μὲν τοῦ ῥυθμοῦ πλείους εἰσὶ φύσεις) and commented on their different types. Now he proposes to speak about the type that is applied to music.[98] This is certainly reminiscent of his approach in the *Harmonica* (especially in *De principiis*), where he began with more general considerations and then applied them specifically to music.

---

graph of the reassembled papyrus appears as plate II; the text, together with an English translation, appears in Pearson, *Elementa rhythmica,* 36–44); and especially L. E. Rossi, "POxy 9 + POxy 2687: Trattato ritmico-metrico," in *Aristoxenica, Menandrea, fragmenta philosophica,* ed. Francesco Adorna, Studi e testi per il corpus dei papiri filosofici greci e latini, iii; Accademia toscana di scienze e lettere «La Colombaria», Studi, xci (Florence: Olschki, 1988), 11–30.

The *Excerpta Neapolitana* (also known as Ptolemy's *Musica*) were so called by Karl von Jan because of their appearance in two manuscripts preserved in the Biblioteca Nazionale in Naples. A text appears in Jan 411–21, but the tradition of this set of excerpts is more complex than Jan or Pearson (*Elementa rhythmica,* xix, 28–31) suggest. Neither of them realized that the excerpts dealing with rhythm (Jan's 9–15 and 20–22) first appear in one of the earliest surviving sources, Vaticanus gr. 2338 (*RISM BXI,* **234**); thereafter, they also appear in Parisinus gr. 3027 (*RISM BXI,* **101**), Bononiensis gr. 2432 (*RISM BXI,* **158**), Florentinus Riccardianus gr. 41 (K.II.2) (*RISM BXI,* **176**), and Neapolitanus gr. 260 (III.C.2) (*RISM BXI,* **201**).

Pearson (*Elementa rhythmica,* xix) states that Psellus's introduction (*Prolambanomena*) is preserved in five manuscripts; the text he presents (pp. 20–27), however, is based on a collation of only two, the fourteenth-century Venetus Marcianus gr. 524 and the sixteenth-century Monacensis gr. 98. One of the five in Pearson's list, Upsaliensis gr. 47 (*RISM BXI,* **293**), does not in fact contain this particular Psellus text, although it does contain other works by the author. Though Pearson's *Elementa rhythmica* suggests otherwise, it is important to note that no thorough and systematic investigation of the manuscripts containing Psellus's musical writings has yet been made (see chapter 7 *infra*), and there are most probably additional sources for this treatise.

[98] νῦν δὲ ἡμῖν περὶ αὐτοῦ λεκτέον τοῦ ἐν μουσικῇ ταττομένου ῥυθμοῦ (Pearson 2.3–4; for a full listing of other editions and translations of the *Elementa rhythmica,* see the Bibliography under "Aristoxenus"). As to the other types of rhythm, Aristides Quintilianus (*De musica* 1.13) states: "The term 'rhythm' is used in three ways: it is used for motionless bodies (as we speak of a eurhythmic statue), for all things that move (for so we say that someone walks eurhythmically), and in particular sense for sound" (Ῥυθμὸς τοίνυν καλεῖται τριχῶς· λέγεται γὰρ ἐπί τε τῶν ἀκινήτων σωμάτων [ὥς φαμεν εὔρυθμον ἀνδριάντα] κἀπὶ πάντων τῶν κινουμένων [οὕτως γάρ φαμεν εὐρύθμως τινὰ βαδίζειν] καὶ ἰδίως ἐπὶ φωνῆς· [W.-I. 31.3–6]; Mathiesen, *AQ on Music,* 94).

In the *Harmonica*, Aristoxenus was concerned with identifying the most basic and irreducible elements of harmonics in his seven categories of genera, intervals, notes, scales, tonoi, modulation, and melic composition, but he was also very much interested in such subtle and sophisticated matters as correct identification of the phenomena, musical logic, and comprehension. The *Elementa rhythmica* exhibits some of the same approach. First, chronos (χρόνος), or time, and the sensing of it are identified as basic principles in the science of rhythm. Then, he distinguishes between rhythm and something rhythmized by drawing an analogy with form and something formed. A body can be formed in various ways, but the particular body is not the same as the form itself. Likewise, various melodic or verbal patterns, for example, can be rhythmized in various ways, but any particular rhythmization is not the same as rhythm itself. Neither form nor rhythm come into being unless there is something to be formed or rhythmized.[99]

Since undifferentiated chronos cannot divide itself, a rhythmized pattern divides the chronos. Aristoxenus observes, however, that not every division of chronos is rhythmic. Indirectly recalling the principles of synthesis, continuity, and consecution developed in the *Harmonica*, he notes that his audience is familiar with the synthesis of letters and intervals, which allows only a few combinations. The same principle applies to chronoi, "for many symmetries and orders of chronoi appear to be quite alien to the sense, while a certain few are suitable and can be applied to the nature of rhythm."[100] Thus, a rhythmization can be arrhythmic as well as rhythmic, and it can be found in diction, melos, and bodily motion. Diction divides chronos "by letters, syllables, words, and all such things; melos by its own notes, intervals, and scales; and motion by points, forms, and whatever else is a part of motion."[101]

---

[99] This bears a strong resemblance to Aristoxenus's formulation of Becoming and Having Become in the Prologue of the *Elementa Harmonica* (see p. 323 *supra*). Here, Aristoxenus uses the passive participles ῥυθμιζόμενον and σχηματιζόμενον to express his concepts of "something rhythmized" and "something formed." This analogy probably recalls Plato's theory of forms, but as σχῆμα and σχηματίζω are also used in reference to the various poses of the body in dance (cf. Aristides Quintilianus *De musica* 1.13–14; 2.4, 6, 10), it is quite possible Aristoxenus intends the analogy to relate the visual dimensions of dance to the temporal dimensions of rhythm. Cf. Psellus *Prolambanomena* 2 and 13 (Pearson 20 and 24).

[100] πολλαὶ μὲν γὰρ αὐτῶν συμμετρίαι τε καὶ τάξεις ἀλλότριαι φαίνονται τῆς αἰσθήσεως οὖσαι, ὀλίγαι δέ τινες οἰκεῖαί τε καὶ δυναταὶ ταχθῆναι εἰς τὴν τοῦ ῥυθμοῦ φύσιν (Pearson 6.5-8). Cf. *Excerpta Neapolitana* 11 (Pearson 28).

If chronos is to be divisible, there must be some basic smallest unit of time. Aristoxenus calls this the "protos chronos" (πρῶτος χρόνος) and observes that it may contain only a single note, syllable, or point. The double duration is described as "diseme," the triple as "triseme," the quadruple as "tetraseme," and so on. Aristides Quintilianus (*De musica* 1.14) echoes Aristoxenus's definition of the protos chronos and refers to rhythmic patterns extending to twenty-five chronoi.

In the *Harmonica,* Aristoxenus took great pains to derive his principles and elements from the dynamic phenomena of music. Thus, the characteristics of a particular note or interval were not inherent but depended on their functions within a musical context. Using the analogy of an interval in harmonics—which may be either simple or complex depending on the notes that form it—and the same terminology, Aristoxenus remarks that chronos, too, may be simple or complex: simple if it is occupied by a single syllable, note, or point; complex if occupied by more than one. In an absolute sense, chronos is simple if it is not divided by any rhythmized pattern, complex if divided by all rhythmized patterns, and both simple and complex if divided by some rhythmized patterns but not by others. Truly simple chronos, then, is the protos chronos; complex chronos always contains more than a single syllable, note, or point; and chronos both simple and complex contains only one divisor of one type (that is, from diction, melos, or motion) and more than one from the other types. These categories could indeed encompass all possible rhythmized patterns.[102]

---

[101] οἷον γράμμασι καὶ συλλαβαῖς καὶ ῥήμασι καὶ πᾶσι τοῖς τοιούτοις· τὸ δὲ μέλος τοῖς ἑαυτοῦ φθόγγοις τε καὶ διαστήμασι καὶ συστήμασιν· ἡ δὲ κίνησις σημείοις τε καὶ σχήμασι καὶ εἴ τι τοιοῦτόν ἐστι κινήσεως μέρος (Pearson 6.18–21). Pearson translates διαστήμασι καὶ συστήμασιν as "silent intervals and groups of notes," but this misrepresents Aristoxenus's technical terminology from the *Harmonica.* The "points and forms" are poses and gestures used in dance and rhetoric; Plutarch *Quaestiones convivales* 9.15 (747b–748d) describes some of them. For a modern scholarly description, see Pickard-Cambridge, *Dramatic Festivals,* 171–76 and 246–57. On rhythm in diction, melos, and motion, cf. Aristides Quintilianus *De musica* 1.13; Psellus *Prolambanomena* 3, 5, and 13 (Pearson 20, 22, 24); *Excerpta Neapolitana* 20 (Pearson 30).

At the beginning of the *Elementa rhythmica,* Aristoxenus observed that the sensing of chronos was basic to the science of rhythm. In order for the complex divisions of chronos to be sensed, they must be articulated in some way, and Aristoxenus accordingly turns his attention to the role of the foot (πούς). Some feet consist of two chronoi, others of three, and still others of four. Although feet may have more than four chronoi as they are employed in rhythmic composition, they will never have more than four points in their basic structure. In each case, these points involve motion upwards (ἄνω) and downwards (κάτω). A few paragraphs later, Aristoxenus associates upward motion with the familiar term "arsis" (ἄρσις) and downward motion with the less familiar term "basis" (βάσις). The ratio of arsis to basis in a foot may be equal (e.g., two chronoi to two chronoi, as in dactylic –⏑⏑ or anapestic ⏑⏑– feet), duple (e.g., 2:1 or 1:2, as in trochaic –⏑ or iambic ⏑– feet), or irrational, that is, "an irrationality between the two ratios recognizable to the sense, between the equal and the duple; this foot is called an irrational choreic."[103] Aristides Quintilianus (*De musica* 1.17) cites two irrational choreics, an iamboid and a trochoid. He describes the iamboid as like a dactyl in rhythm and an iamb in diction, with a long arsis and two theses. Such a description suggests that the rhythmic pattern would be –⏑⏑, like the dactyl, but the value of the long syllable would be less than the total value of the two short syllables, producing in terms of duration a foot closer to the iamb, ⏑– (i.e., something like ⌢⏑̄⏑). The trochoid is described as an inversion, with two arses and a long thesis. Both would indeed have ratios between equal and duple.

Although Aristoxenus himself does not provide a description of the irrational choreic, he is anxious to clarify his sense of the term "irrational." Reminding his audience of the inadequacy of numbers to demonstrate the various real musical intervals and the functional meaninglessness of a twelfth-tone, Aristoxenus points out that "irrational" here means only that the ratio cannot be expressed in simple integers. In terms of actual usage, however, a rhythm is rational if it is appropriate to the rhythmic composition.[104]

---

[102] Aristides Quintilianus's definitions of simple and complex rhythms (*De musica* 1.14) differ: his simple rhythms are those composed of just a single genus of foot, the complex have two or more, and the mixed (described more fully in 1.17) combine different genera into complex patterns such as dochmiacs and prosodiacs. Cf. Psellus *Prolambanomena* 7 and 16 (Pearson 22 and 26).

[103] ἔσται δ' ἡ ἀλογία μεταξὺ δύο λόγων γνωρίμων τῇ αἰσθήσει, τοῦ τε ἴσου καὶ τοῦ διπλασίου. καλεῖται δ' οὗτος χορεῖος ἄλογος (Pearson 12.27–30). Cf. *Excerpta Neapolitana* 10 (Pearson 28).

In the fragment "On the protos chronos" preserved by Porphyrius, Aristoxenus observes that inasmuch as rhythms may move at any number of different paces, or tempi (ἀγωγαί), it might appear that there would be a potentially infinite number of protoi chronoi, defying any attempt at scientific classification. Recalling his argument in the *Harmonica* against an infinity of potential intervallic dimensions, Aristoxenus points out that the notion of infinity is hostile to every science, and moreover, feet are, in fact, not constructed with an infinity of chronoi.[105] Although the protos chronos may move at different tempi, in terms of its function within any given foot and its ratio to the other durations, it will always remain the same: the tempo of the protos chronos does not change in any way its function within a rhythmic complex. As in the *Harmonica,* Aristoxenus here again reduces a potential infinity to a manageable series of archetypal genera—in this case, rhythmic genera.

The tempo of a rhythm is closely related to its magnitude (μέγεθος), the first of seven distinctions Aristoxenus specifies for rhythmic feet. His other distinctions—some of which also appear in the *Harmonica*—are by genus, rational or irrational (ῥητός, ἄλογος), simple or complex, division (διαίρεσις), form, and antithesis (ἀντίθεσις).[106] For each of these, he supplies a simple definition; in several cases, the definitions can be expanded from other sources.

---

[104] Aristoxenus hypothesized the twelfth-tone in order to demonstrate "irrational" intervals in the *Harmonics* (see p. 313 *supra*). He never actually refers to the *Harmonica* in the *Elementa rhythmica,* but the references to harmonics, the analogies drawn between harmonics and rhythmics, and the employment of parallel terminology certainly recall the *Harmonica*—or point towards it, if the *Elementa rhythmica* is the earlier work. Psellus *Prolambanomena* 8–12 and 14–16 (Pearson 22–26) largely parallels Aristoxenus's description of rhythmic feet, including extension to twenty-five chronoi, description of arsis and basis, typical ratios of arsis to basis (Psellus adds 3:2, 3:1, and 4:3), irrationality, and analogy with harmonics. The *Excerpta Neapolitana* 9–14 (Pearson 28, 30) are highly abbreviated but also describe the rhythmic foot, arsis and thesis, rhythmic ratios (including 3:2 but not 3:1 or 4:3), and rhythmic extension to twenty-five chronoi.

[105] εἶναι γὰρ πολέμιον πάσαις ταῖς ἐπιστήμαις τὸ ἄπειρον ...; ... οὔτε γὰρ πόδας συντίθεμεν ἐκ χρόνων ἀπείρων (Pearson 32). Cf. pp. 305, 310, and 332–33 *supra.*

For the first distinction, Aristoxenus simply states that feet can differ from one another with respect to magnitude. In Book I of the *Elementa harmonica* (section I/B/2), however, he elaborates on the relationship between magnitude and tempo:

> When the ratio by which the genera are distinguished is constant, the magnitudes of the feet change because of the function of tempo; and when the magnitudes are constant, the feet become dissimilar. The same magnitude can be both a foot and a conjunction. It is evident that the differences of divisions and forms come from a certain constant magnitude. To speak generally, rhythmic composition is subject to many and all kinds of motions, but the feet, by which we mark the rhythms are always simple and the same.[107]

Aristides Quintilianus provides an even clearer definition in *De musica* 1.19, where tempo and magnitude are specifically related:

> Tempo is the speed or slowness of the chronoi, for example, whenever, while preserving the proportions that the theses make to the arses, we present the magnitudes of each chronos in different ways. The best tempo for rhythmic exposition is a certain intermediate dimension of the theses and arses.[108]

Earlier (1.14), when listing the seven distinctions of Aristoxenus, although without specific attribution, Aristides Quintilianus observed that a triseme foot differs from a diseme foot with respect to magnitude. Thus, it seems clear that rhythmic theory considered magnitude to be a matter both of the number of protoi chronoi and of their tempo within a rhythmic foot.[109]

---

[106] Psellus *Prolambanomena* 16 mentions the first five of these distinctions.

[107] καὶ γὰρ μένοντος τοῦ λόγου, καθ' ὅν διώρισται τὰ γένη, τὰ μεγέθη κινεῖται τῶν ποδῶν διὰ τὴν τῆς ἀγωγῆς δύναμιν, καὶ τῶν μεγεθῶν μενόντων ἀνόμοιοι γίγνονται οἱ πόδες· καὶ τὸ αὐτὸ μέγεθος πόδα τε δύναται καὶ συζυγίαν· δῆλον δ' ὅτι καὶ αἱ τῶν διαιρέσεών τε καὶ σχημάτων ⟨διαφοραί⟩ περὶ μένον τι μέγεθος γίγνονται. καθόλου δ' εἰπεῖν ἡ μὲν ῥυθμοποιΐα πολλὰς καὶ παντοδαπὰς κινήσεις κινεῖται, οἱ δὲ πόδες οἷς σημαινόμεθα τοὺς ῥυθμοὺς ἁπλᾶς τε καὶ τὰς αὐτὰς ἀεί (da Rios 43.16–44.3). A "conjunction" (syzygy) is the composition of two simple and dissimilar feet; references to syzygy appear in *P.Oxy*. 2687.

[108] Ἀγωγὴ δέ ἐστι ῥυθμικὴ χρόνων τάχος ἢ βραδυτής, οἷον ὅταν τῶν λόγων σῳζομένων οὓς αἱ θέσεις ποιοῦνται πρὸς τὰς ἄρσεις διαφόρως ἑκάστου χρόνου τὰ μεγέθη προσφερώμεθα. ἀρίστη δὲ ἀγωγὴ ῥυθμικῆς ἐμφάσεως ἡ κατὰ μέσον τῶν θέσεως καὶ τῶν ἄρσεων ποσὴ διάστασις (W.-I. 39.26–30 [rejecting Tyrwhitt's emendation adopted by W.-I.]). Mathiesen, *AQ on Music,* 102.

[109] This may help to explain the ostensible confusion in the *Excerpta Neapolitana* 14–15, where various genera are described as being in diseme, triseme,

The second and third distinctions pertain to the ratios between the arsis and the thesis—whether they are equal, duple, or "any other of the eurhythmic chronoi"[110]—while the fourth distinction covers feet that are compounded from smaller rhythmic feet. Aristides Quintilianus (*De musica* 1.14 and 17) adds that complex feet are composed of two or more genera, such as the dochmiacs (first dochmiac: ⏑–|–⏑–; and second dochmiac: ⏑–|–⏑⏑|–⏑⏑⏑) and prosodiacs (three-feet prosodiac: ⏑⏑|⏑–|–⏑; four-feet prosodiac: ⏑⏑|⏑–|–⏑|⏑–; and two-conjunction prosodiac: –⏑⏑–|––⏑⏑).[111]

The final three distinctions involve different arrangements of the feet. Feet may have divisions in differing locations, the parts that comprise their forms may be arranged in differing orders, and the positions of arsis and thesis may be exchanged. These three distinctions are closely related. A foot such as –– could be divided into –⏑⏑ or ⏑⏑– or ⏑⏑⏑⏑; each of these is a different division and each results in a different form. Antithesis might be possible in these feet, but Aristoxenus seems to envision cases where the ratio between arsis and thesis is unequal. Aristides Quintilianus (*De musica* 1.14) offers the same sort of definition for antithesis: one foot has the larger chronos leading and the smaller following, while the other is the opposite.

The fragment of the *Elementa rhythmica* concludes with a listing of the basic genera of rhythmic feet: dactylic, iambic, and paeonic. The dactylic is in equal ratio, the iambic in duple ratio, and the paeonic in sesquialteran ratio;[112] the precise distribution of the chronoi to arsis and thesis depends on the particular rhythm. These magnitudes are, respectively, tetrasemes, trisemes, and pen-

---

tetraseme, or pentaseme tempo (ἀγωγή). Their difference, then, is a difference in magnitude, but it is equally true that if the tempo of the protos chronos remained constant, the pace of a rhythmic foot with a greater number of chronoi would be slower than the pace of one with fewer chronoi. Psellus *Prolambanomena* 1 makes it clear that the tempo of a text could be flexible; there was not one more or less fixed duration for a protos chronos. In addition, *P.Oxy.* 2687 (9) and the *Excerpta Neapolitana* 21 make it clear that the grammatical meter of a syllable may be overridden by a rhythmic pattern; for examples in the musical fragments, see Mathiesen, "Rhythm and Meter," 159–80.

[110] ὁ δ' ἄλλον τινὰ τῶν εὐρύθμων χρόνων (Pearson 16.2–3).

[111] For examples of dochmiacs and prosodiacs in Archilochus and in a surviving fragment of ancient Greek music, see chapter 2, pp. 73 and 117–20 *supra*.

[112] Cf. Aristides Quintilianus *De musica* 1.15–16; Psellus *Prolambanomena* 17; *Excerpta Neapolitana* 13.

tasemes. For the tetrasemes and pentasemes, ratios such as 3:1 and 4:1 are theoretically possible, but Aristoxenus dismisses them in favor of 2:2 and 3:2. In addition, hexaseme magnitudes can be taken in the iambic or dactylic genus, as 2:4 or 3:3 (but not 5:1), while octaseme magnitudes can be considered dactylic. Aristoxenus does not consider any ratio of heptaseme magnitudes to be rhythmic, and even Aristides Quintilianus (*De musica* 1.14) says merely that "some also add the sesquitertian,"[113] i.e., 4:3.

The fragment of the *Elementa rhythmica* does not provide sufficient information to determine with certainty which sections would have followed the truncation of the treatise in the surviving sources. Aristides Quintilianus refers to five parts of rhythmics (*De musica* 1.13): protos chronos, genera of feet, tempo, modulation, and rhythmic composition. The first three of these are treated to some extent in the surviving portion of Aristoxenus's *Elementa rhythmica* as well as in Aristides Quintilianus's treatise, which also includes brief treatments of rhythmic modulation (μεταβολὴ ῥυθμική) and rhythmic composition (ῥυθμοποιΐα). Are these perhaps derived from the lost portions of Aristoxenus's *Elementa rhythmica*? Aristides Quintilianus follows his discussion of rhythmics with one on metrics, concluding Book I of his treatise with a brief definition of poetry,[114] but as metrics and poesy are clearly distinct fields, it seems unlikely these represent sections lost in the *Elementa rhythmica*.

By contrast, Oxyrhynchus Papyrus 9 and 2687, the extended fragment on rhythmics preserved on papyrus, may represent part of a work by Aristoxenus, perhaps even part of the *Elementa rhythmica*. The text of the papyrus and its reconstruction are open to varying interpretations, and this is not the place for a detailed consideration.[115] In any event, the fragment provides one of the precise topics conjectured as missing from the other sources of the *Elementa rhythmica*: rather specific comment on rhythmic composition, including references to tempo, division, conjunction, and form. The language and approach certainly suggest Aristoxenian vocabulary and principles, but they are also reminiscent of Aristides Quintilianus's treatise. Suffice it to say that the papyrus provides ample evidence of the application of theoretical principles to the analysis of complex rhythmic patterns.

---

[113] προστιθέασι δέ τινες καὶ τὸ ἐπίτριτον (W.-I. 33.30); cf. Psellus *Prolambanomena* 9. In *De musica* 1.18, Aristides Quintilianus describes a series of possible ratios for a dekaseme rhythm, rejecting all those that do not produce some combination of equal, sesquialteran, and sesquitertian ratios.

[114] On these subjects, see pp. 538–41 *infra*.

[115] Rossi ("POxy 9 + POxy 2687," 11) proposes a date between the first and second centuries C.E.; earlier scholars have dated it to the mid-third century C.E. See n. 97 *supra*; Pearson, *Elementa rhythmica*, 36–44 and 77–86; Théodore Reinach, "Les nouveaux fragments rhythmiques d'Aristoxène," *Revue des études grecques* 11 (1898): 389–418; and Willem John Wolff Koster, "Quelques remarques

Though known today only through a series of substantial fragments, short excerpts, and intriguing titles, Aristoxenus's work still conveys an extraordinary array of remarkable insights. His treatises form the basis for the later technical—or "Aristoxenian"—theorists, and even later writers such as Ptolemy and Boethius who disagreed with Aristoxenus, perhaps because they misunderstood him, could not ignore his theoretical conceptions. With the possible exception of Ptolemy himself, certainly no other Greek theorist exerted a comparable force on the development of later music theory.

The Sectio Canonis

If Aristoxenus's *Harmonica* and *Rhythmica* represent the best examples of the application of Aristotelian science to music, the *Sectio canonis* represents the fullest and most systematic surviving application of Pythagorean mathematics to very specific musical topics: consonance, the magnitudes of certain consonant intervals, the location of movable notes in an enharmonic tetrachord, and the location of the notes of the Immutable System on a monochord. Aristoxenus is not mentioned in the *Sectio canonis*, but some parts of the treatise can be viewed as a defense of traditional Pythagorean measurements of musical intervals against Aristoxenus's—or some other theorist's—geometric conceptions of pitch space.

The content, method, and even the authorial attribution of the *Sectio canonis* evolved over time as it was studied and copied by the various scribes and scholars who preserved it in the surviving manuscript sources. Unlike any of the other treatises that make up the corpus of ancient Greek music theory, the *Sectio canonis*

---

sur l'étude de rythmique Ox. Pap. 2687(9)," *Revue des études grecques* 85 (1972): 47–56.

exists in three quite distinct versions: a long version in Greek, which is, with one exception, always transmitted in the manuscripts in tandem with the *Harmonica introductio*, a treatise now commonly ascribed to Cleonides, though in twenty of these thirty-two manuscripts, the *Sectio canonis* itself is attributed to Euclid;[116] a shorter version in Greek preserved in Porphyrius's commentary to Ptolemy's *Harmonica* 1.5, where the treatise is attributed to Euclid; and a still shorter version in Latin preserved without attribution in Boethius's *De institutione musica* 4.

In a recent monograph, André Barbera has provided an exhaustive study of the evolution of this treatise from a relatively short and straightforward collection of propositions employing Pythagorean arithmetic to a longer series in which the Pythagorean propositions were enlarged to embrace specific musical issues by the addition of a short introduction on musical physics and a series of musical corollaries. All this was gradually recast in terms of Euclidean geometry, leading finally to the long Greek version known commonly in the Renaissance and thereafter, a version that includes a consideration of the movable notes in the enharmonic tetrachord and, at the end, a full-fledged division of a monochord—a *sectio canonis* (or, in Greek, κατατομὴ κανόνος)—from which the treatise takes its name. In this long form, the *Sectio canonis* may be viewed as comprising four sections: the introduction, nine mathematical propositions, the musical corollaries, and the enharmonic passage—a refutation of the geometric division of the tetrachord—, followed by the location of the notes of the "Immutable System" on a monochord.[117]

---

[116] For a discussion of the conflicting attributions of Cleonides's *Harmonica introductio*, see pp. 366–68 *infra*.

[117] Barbera, *Division of the Canon* (see chapter 1, n. 23), 1–3, 38–62. For other editions and translations of the *Sectio canonis*, see the Bibliography under "Cleonides" and "Euclid." On this treatise in general, see Andrew Barker, "Methods and Aims in the Euclidean *Sectio canonis*," *Journal of Hellenic Studies* 101 (1981): 1–16 (response in André Barbera, "Placing *Sectio canonis* in Historical and Philosophical Contexts," *Journal of Hellenic Studies* 104 [1984]: 157–61); Alan C. Bowen, "Euclid's *sectio canonis* and the History of Pythagoreanism," in *Science and Philosophy in Classical Greece*, ed. A. C. Bowen, Sources and Studies in the History and Philosophy of Classical Science, vol. 2 (New York: Garland, 1991), 164–87; Flora R. Levin, "Unity in Euclid's 'Sectio canonis,'" *Hermes* 118 (1990): 430–43; Thomas J. Mathiesen, "An Annotated Translation of Euclid's Division of a

The protracted evolution of the treatise, as well as a number of internal inconsistencies, make Euclid's authorship quite unlikely. There is, however, some evidence in favor of Euclid: the shorter version of the *Sectio canonis* quoted by Porphyrius is attributed to Euclid, treatises on music and on the canon are ascribed to Euclid by Arabic scholars from the tenth century onward, and later Byzantine scholars such as Theodorus Metochites (1270–1332) refer to Euclid as an author who wrote on musical subjects. Porphyrius's attribution is telling, but it is important to recall that it applies only to the shorter version of the *Sectio canonis,* which includes just the mathematical propositions and the musical corollaries; the introduction, enharmonic passage, and the canon itself do not appear, though they may already have been a part of the treatise. References after Porphyrius cannot be positively identified with the *Sectio canonis* and may simply derive from Porphyrius's attribution or manuscripts that attribute the *Sectio canonis* and the *Harmonica introductio* to Euclid. The evidence of the manuscripts must, however, be used with caution. As already noted, their testimony varies: while some attribute the treatise to Euclid, eleven of them include the *Sectio canonis* as a subsection of Cleonides's *Harmonica introductio.* Although the authorship and date of the *Sectio canonis* must remain open, it probably had evolved into more or less its final form in late antiquity, that is, sometime between the fourth and sixth centuries C.E.[118] An earlier date is possible, but even if such a late date is correct, this would not reduce the significance of the treatise. The *Sectio canonis* unquestionably contains important Pythagorean material known and applied by musical theorists ranging from before the time of Aristoxenus well into the Middle Ages and beyond. As such, it is one of the most important early theoretical sources.

The introduction to the *Sectio canonis* defines the physical basis of sound as a series of motions; without motion, which produces a percussion (πληγή) of air, there would be no sound and, by implication, no subject for the *Sectio canonis.* The author associates denser motion with greater string tension and higher pitch, sparser motion with lesser string tension and lower pitch. Inas-

---

Monochord," *Journal of Music Theory* 19 (1975): 236–58; and Bartel Leendert van der Waerden, "Die Harmonielehre der Pythagoreer," *Hermes* 78 (1943): 163–99.

[118] A full investigation of the question of authorship appears in Barbera, *Division of the Canon,* 3–36.

much as pitches are related to the number of motions of a string (or, in more modern terms, the vibration rate of the string), it follows that the pitches of notes are comprised of certain numbers of parts, and this allows them to be described and compared in numerical terms and ratios. The author's audience is thereby prepared for the following series of mathematical propositions and musical corollaries. First, however, some basic premises and terminology are introduced: notes can be related to one another in one of the three principal numerical ratios—multiple, superparticular, and superpartient; some notes are consonant, some dissonant; consonant notes make a blend (κρᾶσις), while dissonant notes do not; and consonant notes form either a multiple or a superparticular ratio with one another.[119]

It can hardly be coincidence that both Aristoxenus's *Harmonica* and the *Sectio canonis* begin by addressing the relationship between sound and motion, although their particular perspectives differ. Aristotle spends a considerable amount of time drawing distinctions between motion and rest in *Physica* 5–6, with occasional references to sound, while in *De anima* 2.8, he comments at length on sound as a percussion (πληγή) of air perceived by the hearing, with specific reference to high and low sounds and the relationship between rate of motion and pitch. The introduction to the *Sectio canonis* clearly reflects the context of Aristotelian acoustics. At the same time, in its relationship of pitch to number and the concomitant comparison of pitches and intervals by means of number, discoveries strongly associated with Pythagoras, the introduction has a decidedly Pythagorean flavor.[120]

---

[119] Multiple ratios are those in which the greater term is some exact integral multiple of the lesser term (nx:x, where n is an integer greater than 1); superparticular, those in which the greater term contains the lesser once, plus one integral part of the lesser ([x + one integral part of x]:x, where x is an integer greater than 1); superpartient, those in which the greater term contains the lesser once, plus more than one integral part of the lesser ([x + m]:x, where x is an integer greater than m and m is an integer greater than 1 that cannot evenly divide x). It is important to note the underlying but unstated limitation to the tetraktys of the decad (i.e., 1, 2, 3, 4), which can produce the fourth (4:3), fifth (3:2), octave (2:1), octave-and-a-fifth (3:1), double octave (4:1), and various other intervals by addition and subtraction of this basic set. For a detailed discussion of the introduction, see Barbera, *Division of the Canon*, 48–58.

[120] Porphyrius's version of the *Sectio canonis* omits the introduction.

The nine mathematical propositions embody the most basic Pythagorean principles of adding and subtracting intervals (διαστήματα).[121] The propositions do not specifically state that these should be construed as **musical** intervals, but the context certainly allows them to imply musical terms. Each proposition is constructed with an introductory statement, in either conditional or positive terms, followed by a proof. Although there are differences of detail among the versions, all nine propositions appear in all the versions of the *Sectio canonis*; the Latin version preserved by Boethius ends after the ninth proposition.[122] The propositions may be summarized as follows:

1	If a multiple interval doubled makes some interval, the new interval is multiple.
2	If an interval doubled makes a multiple whole, the original interval itself is multiple.
3	No mean number—neither one nor many—can fit proportionately between the terms constituting a superparticular interval.
4	If a non-multiple interval is doubled, the whole is neither multiple nor superparticular.
5	If an interval doubled does not make a multiple whole, the original interval was not multiple.
6	The duple interval is composed of the two largest superparticular intervals, the sesquialtera (i.e., 3:2) and the sesquitertia (i.e., 4:3) (two proofs are provided for this statement).
7	Adding a duple and a sesquialteran interval produces a triple interval.
8	Subtracting a sesquitertian interval from a sesquialteran interval produces a sesquioctaval (i.e., 9:8) interval.
9	Six sesquioctaval intervals are greater than one duple interval.

In the Greek versions of the *Sectio canonis*, the musical corollaries are generally presented in two different forms: one commonly known in the Renaissance and thereafter, in which the corollaries appear as propositions 10–16; and another form, perhaps more authoritative, in which the first corollary appears as proposition 10 and the rest are collected as proposition 11.[123] The corollaries and the mathematical propositions on which they rest may be summarized in the following table, where column A shows the common Renaissance numbering of the propositions; B, the more authoritative numbering; C, the corollary; and D, the propositions on which it is based.

---

[121] A useful and accessible introduction to Pythagorean mathematics is provided by Richard Crocker, "Pythagorean Mathematics and Music," *Journal of Aesthetics and Art Criticism* 22 (1963–64): 189–98 and 325–35; and Sir Thomas Heath, *A History of Greek Mathematics*, 2 vols. (Oxford: Clarendon, 1921; reprint ed., New York: Dover, 1981), 1:65–117.

[122] See Barbera, *Division of the Canon*, 38–60, 118–49, 188–217, and 234–57. The logic of each demonstration is detailed in the annotations to these pages.

A	B	C	D
10	10	The octave interval is multiple.	Introduction and propositions 2–3.
11	11a	The intervals of both a fourth and a fifth are superparticular.	Introduction and propositions 4–5.
12	11b	The octave interval is duple, combined from the fifth (the sesquialtera) and the fourth (the sesquitertia), the two largest superparticular intervals; the interval of an octave-and-a-fifth is triple; and the double octave is quadruple.	Propositions 6–7 and 10–11 (11a).
13	11c	The whole-tone interval is sesquioctaval.	Proposition 8.
14	11d	The octave is less than six whole-tones.	Propositions 9, 12 (11b), and 13 (11c).
15	11e	The fourth is less than two-and-a-half tones; the fifth is less than three-and-a-half tones.	Proposition 14 (11d).
16	11f	The whole-tone cannot be divided into two or more equal intervals	Propositions 3 and 13 (11c).

Propositions 10–11 and 15 refer to specific notes in the Immutable System as part of their demonstrations, and as in the *Harmonica* of Aristoxenus, the names of the notes are simply employed without any explanation. There will, however, be some illustration of the actual location of these notes in the monochord division that forms the conclusion of the long version of the *Sectio canonis*. Nevertheless, it is apparent here, as in Aristoxenus's *Harmonica*, that the names of the notes were so well established they could simply be taken for granted by the theorists.

To this point, where the shorter Greek version preserved by Porphyrius terminates, the musical corollaries concentrate exclusively on the consonant intervals and the whole-tone; propositions 10–13 are purely positive, but propositions 14–16 imply a counter-position being refuted. Though Aristoxenus is never mentioned, propositions 15 and 16 directly contradict his demonstration of the equal division of the whole-tone and the fourth as comprised of two-and-a-half tones.[124] If Aristoxenus or some of his followers are intended as the object of refutation, at least this much of the *Sectio canonis* must post-date his treatise. On the other hand, if Aristoxenus is not the object of refutation because the *Sectio canonis* is contemporary or pre-dates him, his demonstrations must have been derived from an earlier tradition, now forgotten.

---

[123] See ibid., 39–40, 150–71, 218–25.

None of the musical corollaries has thus far exhibited any concern for the smaller intervals that define the various genera articulated by Aristoxenus. The long version of the *Sectio canonis,* however, continues with a passage devoted to the location of the movable notes within enharmonic tetrachords: on the one hand, the paranete and the lichanos, and on the other, the parhypate and trite.[125] In the division of the monochord, which concludes the long version of the *Sectio canonis,* locations will also be determined for the movable notes within the diatonic tetrachords, but no locations are provided for the specifically chromatic notes.

The method for locating the notes in an enharmonic tetrachord is identical to the method of ascending and descending fourths and fifths Aristoxenus employed to locate and identify the ditone and the leimma. In the *Sectio canonis,* an initial note, the mese, is established, after which the pattern of ascending-fourth-descending-fifth is twice applied to locate the lichanos, a ditone lower. If the mese were envisioned on its conventional a', the pattern would be a'–d"–g'–c"–f', with the lichanos on f'. By starting from a nete envisioned on its conventional e", the paranete (c") could be discovered in the same manner.

With the pycnon established by the presence of the ditone, the enharmonic passage, relying on proposition 3, observes that the movable notes within the pycnon (i.e., the parhypate or the trite) cannot divide it into two equal parts. Aristoxenus is, of course, not mentioned, but here again, unless he borrowed from earlier sources, it is difficult not to see this passage as a pointed refutation of the spatial conception that allowed him to posit an equal division of any musical interval.[126]

---

[124] See pp. 312–14, 325, and 327–29 *supra.*

[125] In the version commonly known in the Renaissance and thereafter, this passage is divided into propositions 17 and 18.

The division of a monochord that concludes the long version of the *Sectio canonis* is actually comprised of two separate divisions: the first provides locations for all the fixed notes of the diatonic genus in the Immutable System, as well as the lichanos hypaton; the second, locations for the remaining movable notes in the diatonic genus (the monochord is displayed in figure 54).[127]

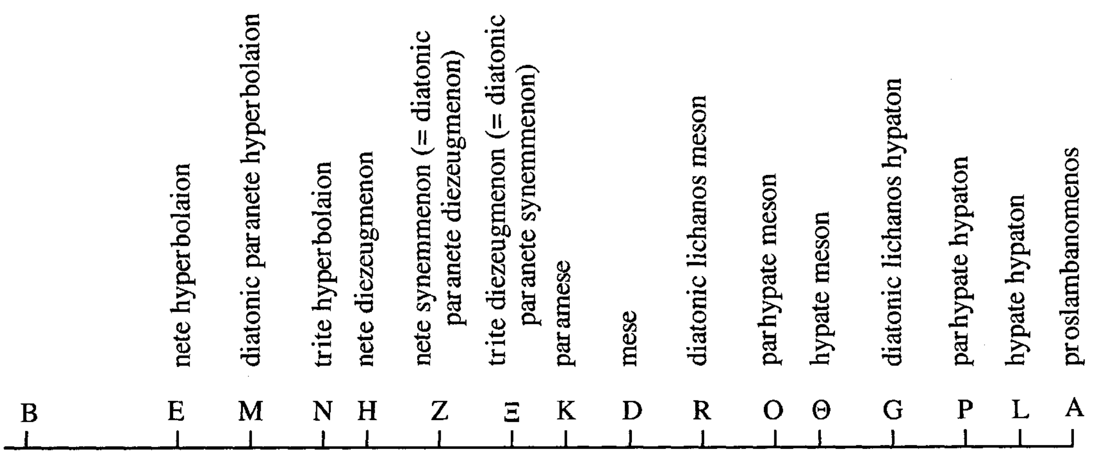

nete hyperbolaion
diatonic paranete hyperbolaion
trite hyperbolaion
nete diezeugmenon
nete synemmenon (= diatonic paranete diezeugmenon)
trite diezeugmenon (= diatonic paranete synemmenon)
paramese
mese
diatonic lichanos meson
parhypate meson
hypate meson
diatonic lichanos hypaton
parhypate hypaton
hypate hypaton
proslambanomenos
B
E
M
N
H
Z
Ξ
K
D
R
O
Θ
G
P
L
A

Figure 54.

The first division—locating points A, B, D, E, G, H, K, L, Θ, and Z—employs only the consonant intervals of the octave, the fifth, and the fourth. It seems incongruous for the lichanos hypaton (point G) to be located in the first division, but it does sound a fourth higher than the lowest note, the proslambanomenos (point A) and is used to locate the nete synemmenon (point Z), an octave higher than the lichanos hypaton. The second division employs the sesquioctaval whole-tone interval, as well as the consonant intervals of the fifth and the fourth. Both divisions together allow one "to mark the canon according to the so-called Immutable System."[128]

On the whole, the *Sectio canonis* remains quite abstract. No interest is shown in any of the musical phenomena or basic conceptual issues Aristoxenus considered so important. In a sense, it represents precisely the sort of limited diagrammatic view of music theory for which the Harmonicists were so severely criticized by Aristoxenus. While it is true that the line drawings associated with the *Sectio canonis* in some of the manuscripts were probably not part of its earliest form,[129] the structure of the demonstrations and the division of the monochord itself are nevertheless expressed in diagrammatic terms. Moreover, the *Sectio canonis* says nothing at all about the ways in which one note might or might not move to another; it makes no specific reference to the various genera, although the enharmonic genus is certainly produced by the demonstrations of propositions 17–18; and it is limited to a single two-octave display. The *Sectio canonis* does, however, present the clearest and most systematic view of the traditional Pythagorean truths about the fundamental principles of consonance that governed music and the harmonious structure expressed in the Immutable System. Although a precise date cannot be assigned to the *Sectio canonis,* the division of the monochord demonstrating the Immutable System provides one of the earliest—if not the earliest—specifications of the notes in the ancient Greek musical system.

---

[126] See pp. 312–14 and 327–29 *supra*.

[127] In the version commonly known in the Renaissance and thereafter, the two divisions are presented as propositions 19 and 20.

[128] Τὸν κανόνα καταγράψαι κατὰ τὸ καλούμενον ἀμετάβολον σύστημα (Barbera 178.1).

The Pythagoreans were not, in any case, particularly concerned with deducing musical science from complex musical phenomena because the imperfection of temporal things naturally precluded their conveying more than a pale reflection of higher reality. The important truths about music were instead to be found in its harmonious reflection of number. As a mere temporal manifestation, the employment of this harmonious structure in actual pieces of music was of decidedly secondary interest.

In a very real sense, the *Sectio canonis* and Aristoxenus's *Harmonica* establish the two basic positions of ancient Greek music theory. For some reason, no further music theory was written in Greek—or, at least, none that is known—until its revival in the second century C.E.[130] When it revives, the Pythagorean and Aristoxenian positions develop, compete, and combine, first in the treatises of Plutarch, Cleonides, Nicomachus of Gerasa, Theon of Smyrna, and Claudius Ptolemy, and later in the writings of Gaudentius, Porphyrius, Aristides Quintilianus, Bacchius Geron, and Alypius.

---

[129] Barbera, *Division of the Canon,* 40–44 and Appendix.

[130] The *De musica* of Philodemus of Gadara is more properly a work of philosophy than one of music theory. In the first and second centuries B.C.E., two Roman authors did write in Latin about music: Marcus Terentius Varro (116–27 B.C.E.) and Polio Vitruvius (fl. first century B.C.E.). Varro's writings on music are lost, although his *Disciplinarum libri IX* may have been the source of the musi-

---

cal lore in Censorinus's *De die natali* (see chapter 7 *infra*). Vitruvius's remarks are included chiefly in his *De architectura* 5.4–5, but references to music occur here and there throughout the treatise (for an edition and English translation, see Vitruvius, *On Architecture*, 2 vols., ed. and trans. Frank Granger, Loeb Classical Library [Cambridge: Harvard University Press, 1931–34]).

V

Music Theory II: The Revival

The second century C.E. enjoyed a long period of imperial stability and prosperity under emperors Trajan (reigned 98–117 C.E.), Hadrian (reigned 117–138 C.E.), Antoninus Pius (reigned 138–161 C.E.), and Marcus Aurelius (reigned 161–180 C.E.). Their support for learning and systematic education was reflected in the establishment of libraries as a common form of public and private munificence. Trajan, for example, founded the Bibliotheca Ulpia, which survived into the fifth century, while Hadrian established the Athenaeum after the model of the Museum at Alexandria. Emperor Hadrian was particularly interested in Attic culture and its preservation, and his successors continued the revival. The new libraries, together with imperial support, provided means and incentives for the study, copying, and comparison of early texts, and it is certainly no coincidence that antiquarians such as Pausanias and Pollux prospered during this period.[1] Likewise, the study of ancient Greek music theory accorded perfectly with the antiquarian interests of the age.

Plutarch

Plutarch of Chaeronea (ca. 50–ca. 120 C.E.), descendant of an old and respected family in Boeotia,[2] was certainly one of the most important Greek authors of his time. As a youth, he studied with Ammonius and later travelled widely, visiting Athens, Egypt, and

---

[1] L. D. Reynolds and N. G. Wilson, *Scribes and Scholars: A Guide to the Transmission of Greek and Latin Literature,* 3d ed. (Oxford: Clarendon, 1991), 24–31 and 45–48.

[2] See map 1, p. 20.

Rome. For the last three decades of his life, he was a priest at Delphi and participated in the revival of the shrine under Trajan and Hadrian. He was also influential in government; the *Suda* states that Trajan granted him consular privileges.[3] A profound student of biography, rhetoric, logic, philosophy, and antiquities, Plutarch advocated the dual patriotism of Greece and Rome—great educator and great power. He wrote more than two hundred separate works, of which some fifty biographies, seventy-eight other works comprising the so-called *Moralia*, and a few fragments are extant today.[4]

Included among the *Moralia* but almost certainly not the actual work of Plutarch, the dialogue *De musica* contains a wealth of information on ancient Greek musical life, and together with a number of authentic works by Plutarch, it was an important source used rather extensively in earlier chapters of this book.[5] Although the Plutarchean *De musica* is not primarily a work of music theory, it does contain some technical material that should be considered at this point.

The *De musica*, it will be recalled, is cast in the form of a dialogue presented by two speakers, Lysias and Soterichus, and moderated by the precentor, Onesicrates. At the end of the dialogue, Onesicrates identifies Lysias as a "practicing kitharode" (χειρουργῶν κιθαρῳδός), while Soterichus is presented as one more interested in the benefit, theory, function, and use of music.[6] Lysias is the first speaker. After describing a number of musical styles and their "inventors," he turns—on the authority of Aristoxenus—to the invention of the enharmonic genus by Olympus.[7] Employing the notes paramese, mese, lichanos, parhypate, and hypate in the diatonic genus, this famous aulete, it seems, began to omit the lichanos, resulting in a ditone between the mese and the parhypate, characteristics of the enharmonic genus. Lysias adds, however, that this special style or scale, which he calls "spondeion" (σπονδεῖον),[8] is distinct from any of the three genera. Indeed, if the paramese, mese, lichanos, parhypate, and hypate were envisioned on their conventional pitches b', a', g', f', and e', the pentachord would be reduced to an atypical tetrachord of b'–a'–f'–e'; although the ditone between a' and f' is typical of the enharmonic genus, the incomposite semitone[9] between f' and e' is not.

---

[3] μεταδοὺς δὲ αὐτῷ Τραϊανὸς τῆς τῶν ὑπάτων ἀξίας προσέταξε μηδένα τῶν κατὰ τὴν Ἰλλυρίδα ἀρχόντων παρὲξ τῆς αὐτοῦ γνώμης τι διαπράττεσθαι (Bekker 864).

[4] For a study of Plutarch as Platonist, see John Dillon, *The Middle Platonists, 80 B.C. to A.D. 220* (Ithaca, New York: Cornell University Press, 1977), chapter 4. See also D. A. Russell, "Plutarch," in *OCD*, 1200–1201.

[5] See pp. 32–34, 59, 61–66, 72, 75, 82, 85, 88, 92, 103–5, 133, 145, 152–53, 155, 178, 217, 231, and 293 *supra*.

[6] πρὸς ὠφέλειαν καὶ πρὸς θεωρίαν, ἀλλὰ γὰρ καὶ δύναμιν καὶ χρῆσιν μουσικῆς (1146e [Ziegler 36.20–21]).

[7] On this figure, see p. 178; also pp. 59, 64, 133, and 223 *supra*. The Olympus here is presumably the "elder" Olympus of mythic time.

This rather straightforward description is complicated by the following passage, perhaps originating as a gloss, in which the substantive "spondeion" gives way to the technical term "spondeiasmos" (σπονδειασμός), which seems to describe a particular interval characteristic of spondeion melos.

> Of these [i.e., the diatonic, chromatic, and enharmonic genera], they put the spondeion first, in which not one of the divisions shows its unique character, unless one, thinking of the more intense spondeiasmos, conjectures that just this is diatonic. It is evident, however, that such a proposition will be both false and unmusical: false because it is less by a diesis than the tone associated with the leader; and unmusical because if one would place the unique character of the more intense spondeiasmos in the function of the whole-tone, it would result in placing two consecutive ditones, the one simple and the other complex. The enharmonic pycnon now used in the meson tetrachord does not seem to be the poet's; this is easy to see when one hears the ancient fashion of aulos-playing: even the semitone in the meson tetrachord is intended to be simple.[10]

---

[8] In general terms, a spondeion is a cup from which a libation—or "sponde" (σπονδή)—is poured, and this quasi-enharmonic "spondeion" style was perhaps originally associated with thank-offerings, truces, or initiation rites (Pollux *Onomasticon* 4.79). Elsewhere in the *Onomasticon* (4.84), Pollux calls the fourth part of the Pythic Nomos "spondeion," although Strabo *Geographica* 9.3.10 provides a different name (see pp. 24–25, 43, 59–60, and 63 *supra*). The phrase "spondeion melos" also appears in Sextus Empiricus *Adversus musicos* 7 (Greaves 130.3–4), where Pythagoras is described as calling upon the aulete to play this melos, thereby calming a group of drunken youths. Although he does not identify it as "spondeion," Aristoxenus (*Harmonica* [da Rios 29.14–30.9]) does refer to a noble style employing a "ditone lichanos" (δίτονος λιχανός).

[9] Because the lichanos has been omitted, there is no note to divide the semitone between f' and e'; thus, it would be incomposite.

[10] *De musica* 1.11: τιθέασι γὰρ τούτων πρῶτον τὸ Σπονδεῖον, ἐν ᾧ οὐδεμία τῶν διαιρέσεων τὸ ἴδιον ἐμφαίνει, εἰ μή τις εἰς τὸν συντονώτερον σπονδειασμὸν βλέπων αὐτὸ τοῦτο διάτονον εἶναι ἀπεικάσειε. δῆλον δ' ὅτι καὶ ψεῦδος καὶ ἐκμελὲς θήσει ὁ

Lysias does not explain the meaning of spondeiasmos, but Aristides Quintilianus, no doubt also drawing on a now-lost passage of Aristoxenus, describes the interval, together with two other special types:

> It remains necessary to speak about eklusis, spondeiasmos, and ekbole, for the ancients employed these intervals for the different types of harmoniai. A descent of three incomposite dieses was called eklusis; an ascent of the same interval, spondeiasmos; and an ascent of five dieses, ekbole. These were given names as modifications of intervals because of the scarcity of their use.[11]

Lysias's reference to the tone associated with "the leader" is also somewhat obscure, but the Aristotelian *Problemata* 19.33 clarifies that the mese could also be called "the leader." The tone associated with the leader must therefore be the tone of disjunction between the mese and the paramese.

Even with the clarifications of Aristides Quintilianus and the Aristotelian *Problemata,* the passage is opaque, but it seems that Lysias is trying to make two points. First, if the "more intense spondeiasmos" is the next interval (c*''–b') above Olympus's original pattern and if the resulting pattern c*''–b'–a' were taken out of context, it might be possible to envision just this as the typical sequence of two whole-tones found in the diatonic genus. This is false, Lysias observes, because the interval c*''–b' is not a whole tone but only a spondeiasmos, three-quarters of a tone, a diesis less than the tone "associated with the leader," that is, the true tone of disjunction between the mese (a') and the paramese (b').

τοιοῦτο τιθείς· ψεῦδος μὲν ὅτι διέσει ἔλαττόν ἐστι τόνου τοῦ περὶ τὸν ἡγεμόνα κειμένου· ἐκμελὲς δ' ὅτι, καὶ εἴ τις ἐν τῇ τοῦ τονιαίου δυνάμει τιθείη τὸ τοῦ συντονωτέρου σπονδειασμοῦ ἴδιον, συμβαίνοι ἂν δύο ἑξῆς τίθεσθαι δίτονα, τὸ μὲν ἀσύνθετον, τὸ δὲ σύνθετον· τὸ γὰρ ἐν ταῖς μέσαις ἐναρμόνιον πυκνὸν ᾧ νῦν χρῶνται οὐ δοκεῖ τοῦ ποιητοῦ εἶναι. ῥᾴδιον δ' ἐστὶ συνιδεῖν, ἐάν τις ἀρχαϊκῶς τινος αὐλοῦντος ἀκούσῃ· ἀσύνθετον γὰρ βούλεται εἶναι καὶ τὸ ἐν ταῖς μέσαις ἡμιτόνιον (1135a–b [Ziegler 10.2–14]).

[11] ῾Ρητέον λοιπὸν περὶ ἐκλύσεως σπονδειασμοῦ τε καὶ ἐκβολῆς· καὶ γὰρ τούτων τῶν διαστημάτων ἡ χρεία πρὸς τὰς διαφορὰς τῶν ἁρμονιῶν παρείληπτο τοῖς παλαιοῖς. ἔκλυσις μὲν οὖν ἐκαλεῖτο τριῶν διέσεων ἀσυνθέτων ἄνεσις, σπονδειασμὸς δὲ ἡ ταὐτοῦ διαστήματος ἐπίτασις, ἐκβολὴ δὲ πέντε διέσεων ἐπίτασις· ταῦτα δὲ καὶ πάθη τῶν διαστημάτων διὰ τὸ σπάνιον τῆς χρήσεως προσηγορεύετο (W.-I. 28.1–7). Mathiesen, *AQ on Music,* 92. Bacchius *Introductio artis musicae* 37 and 41–42 confirms the definitions of eklusis and ekbole but does not define spondeiasmos. Soterichus, later (1141b) in the dialogue, observes that Polymnestus made considerable use of eklusis and ekbole in his Hypolydian pieces. On Polymnestus, see pp. 59 and 64 *supra.*

Moreover, even if one were to change the spondeiasmos into the function of a full whole-tone by expanding the interval c*"–b' into c♯"–b, the result would be unmusical because two consecutive ditones (c♯"–a' and a'–f') would then result: the former complex because the paramese can intervene; the latter simple because Olympus has purged the lichanos, the note between the mese and the parhypate. Lysias's second point is much clearer: the practice of dividing the semitone in the enharmonic genus was a modern invention; the auletes of Olympus's time considered it to be a simple interval.

Lysias concludes his speech shortly after his discussion of the spondeion, but Soterichus returns to the subject and, as is his fashion, expands upon Lysias's presentation. He agrees with Lysias that Olympus and others of his time used relatively few notes in their music. In fact, he states that they used only three notes; these may well be the mese, parhypate, and hypate as described by Lysias.[12] Soterichus then adds, however, that while "the ancients" omitted certain notes from the melos "in their libation style" (ἐν τῷ σπονδειάζοντι τρόπῳ and ἐν τῷ σπονδειακῷ τρόπῳ), they employed some of them in the accompaniments. The options are summarized in the following table.

Note	**Melos**	**Accompaniment**
all notes of the hypaton tetrachord	omitted	omitted
trite diezeugmenon	omitted	employed as consonance with the parhypate
paranete diezeugmenon	employed	omitted [?]
nete diezeugmenon	omitted	employed as a dissonance with the paranete and a consonance with the mese

---

[12] Lysias in fact describes Olympus's spondeion as moving to the parhypate from either the mese **or** the paramese. In cases where the paramese was used, perhaps the mese was also omitted, resulting in a three-note scale of paramese, parhypate, and hypate. In this instance, however, if the paramese was indeed a tone higher than the mese, the interval between the paramese and the parhypate would be a tritone. While this might be possible, it is also possible that Olympus's paramese was only a semitone above the mese (see p. 245 *supra*). In this case, Lysias's description of the second ditone created by the spondeiasmos would seem incorrect because the combination of the semitone (between the mese and the paramese) and the spondiasmos would result in an interval of only five dieses, not even close to a sequential ditone.

nete synemmenon	omitted because the musician would have been ashamed of its ethos	employed as a dissonance with the paranete, paramese, and lichanos

It is important to note that Soterichus does not assign any genus to the notes in the tetrachords he describes, and the conventional pitches of the two movable notes, the trite and the paranete diezeugmenon, are therefore uncertain. Nevertheless, Soterichus's specifications of consonance and dissonance make it possible to unravel his meaning.

The parhypate of Lysias's spondeion melos was earlier established on the conventional diatonic f', and Soterichus's trite diezeugmenon must therefore be c'', exactly the position it would normally occupy in the diatonic genus of the Immutable system. If the trite diezeugmenon is c'', the paranete diezeugmenon must be d'' and the nete diezeugmenon e''. The latter note does indeed form the consonance of a fifth with the mese (a'). Soterichus does not state whether the paranete diezeugmenon is omitted or employed in the accompaniment, but as the other accompanimental consonances have been fifths, it may well have been omitted: with the absence of the lichanos (g') in the spondeion melos, there is no lower note with which it could form a fifth. It could, of course, form a fourth with the mese.

If this interpretation of Soterichus's notes is correct, the presence of the nete synemmenon in the list may seem odd because in the conventional diatonic arrangement, its pitch—though not its function—is commonly presented as identical to the paranete diezeugmenon (d''). On the other hand, if the notes of the diezeugmenon tetrachord are assumed to be in the enharmonic genus to accord with the quasi-enharmonic style of the spondeion melos, the paranete diezeugmenon would fall on c'' rather than d'', which the nete synemmenon would then provide. But in this case, the trite diezeugmenon, presumably dividing the enharmonic pycnon, would fall on b*', and this would not be consonant with the parhypate's f'. Moreover, it would violate the earlier clear statements that there was no enharmonic pycnon in this style and that it emerged from the diatonic genus.

In fact, it is not necessary to propose that Soterichus assumes an enharmonic genus for these upper tetrachords, for he makes it clear that the prohibition of the nete synemmenon in the melos is a matter of its function, not its pitch. The spondeion melos is clearly centered on the hypate, parhypate, mese, and paramese. If the synemmenon tetrachord were introduced by the nete synemmenon, it would effect a modulation eliminating the paramese, which exists only in the diezeugmenon tetrachord, thereby changing the character, or "ethos," of the piece. It might, however, be used in the accompaniment as a dissonance, where it would indeed be dissonant with the paramese (b'). It is less clear why Soterichus includes the lichanos—omitted from the spondeion melos—and the paranete as additional dissonances. Perhaps the tuning of the accompanying instrument is the issue here. The tuning of the synemmenon tetrachord could produce a set of pitches that would be rather different from those produced by the tuning of the diezeugmenon tetrachord, and in this case, the d'' of the nete synemmenon could in fact be dissonant with the d'' of the paranete diezeugmenon.[13]

Of greater importance than these theoretical details is the information provided by this passage about the practice of accompanying melos—a subject of very little technical comment in Greek texts. The passage unquestionably describes an instrumental accompaniment (κροῦσις) above the vocal line, but it does not state whether the accompaniment was note-for-note or intermittent. The Aristotelian *Problemata* 19.16 confirms the use of accompaniments at concordant intervals and suggests that each vocal note was in fact accompanied by two instrumental notes: the first sounding the octave or unison, and the second a fifth—or perhaps a fourth. *Problemata* 19.17–18 and 39 also speak of simultaneously sounding musical lines, but in this case, each of the parts is sung.[14] Somewhat later in his speech (1141a–b), Soterichus states that Archilochus introduced the practice of accompanying below the vocal line, and his style is contrasted with the simpler style of "the ancients," a contrast also specifically drawn by Plato's Athenian Stranger (*Leges* 7 [812d]).[15] These few sources suggest that instrumental accompaniments must have gradually evolved from unison or octave reinforcement of the vocal line into more complicated patterns, first above the vocal line and later below. The more complicated patterns would seem to have grown from the practice of sounding a second consonant note immediately after an octave or unison was sounded with the vocal note. Plato's Athenian Stranger implies that by his time, the patterns had become even more complicated than two instrumental notes for every one vocal note, and this would accord with the virtuosity ascribed to Timotheus and his followers, beginning in the fifth century B.C.E.

---

[13] For a somewhat different view of the passage, see R. P. Winnington-Ingram, "The Spondeion Scale," *Classical Quarterly* 22 (1928): 83–91; based on this is Andrew Barker's "Appendix B" in *Greek Musical Writings,* 1:255–57.

[14] Like many other passages in the Aristotelian *Problemata,* these are somewhat obscure, especially in their use of the terms "antiphonon" (τὸ ἀντίφωνον) and "homophonein" (ὁμοφωνεῖν). While it seems evident in 19.16 that the two terms refer respectively to the octave and the unison, other theorists (including Bacchius, Ptolemy, Gaudentius, and Aristides Quintilianus) use the terms "homophonia" or "homophonic notes" to refer to simple unisons, unisons in which the pitches are the same but the functions of the notes differ, octaves, and compound octaves. *Problemata* 19.16 does not make specific reference to fifths and fourths, but 19.17 contrasts the sound of the fifth with that of the octave. At the end of the problem, the contrast is enlarged to include the sound of the fourth. In view of

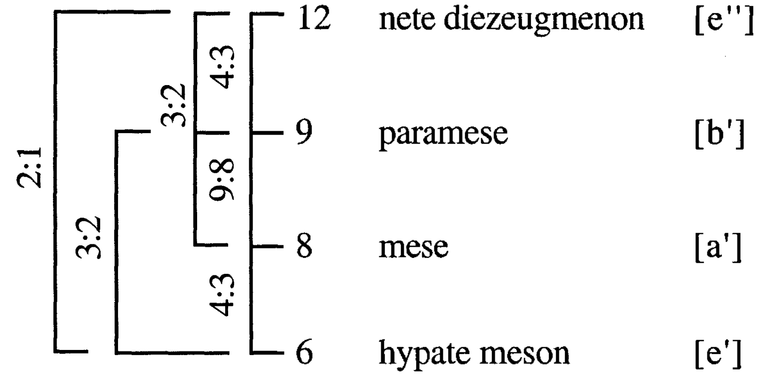
Lysias made no reference to harmonics or mathematics in his speech, but Soterichus is concerned with extending the discussion of music beyond mere technical and historical considerations into the "higher realm" of Pythagorean mathematics and music. Drawing on the famous passage in Plato's *Timaeus* (35b–36b) where the demiurge produces a scale by applying the arithmetic and harmonic means to the duple and triple proportions of the psychogony,[16] Soterichus describes the ways in which the Platonic ratios should be assigned to specific musical notes (see figure 55).

---

the description provided by the Plutarchean Soterichus, it seems reasonable to assume that the fifth, not the fourth, was the preferred consonance in instrumental accompaniments.

[15] For a more detailed examination of this latter passage, see pp. 73–74 *supra.*

[16] For a fuller discussion of this passage, see "Plato, from the *Timaeus,*" in *Strunk's Source Readings in Music History,* vol. 1, *Greek Views of Music,* ed. Thomas J. Mathiesen (New York: Norton, 1998), 19–23. See also pp. 399, 409–10, and 417 *infra.* These means are described in many other Greek scientific works, including Aristides Quintilianus *De musica* 3.5 and Theon of Smyrna *Expositio rerum mathematicarum ad legendum Platonem utilium* (Hiller 113–19); see pp. 426–27 *infra.* For a modern survey of all the means, see Heath, *Greek Mathematics,* 1:85–90.



The mese (8) provides the harmonic mean between the nete diezeugmenon (12) and the hypate meson (6); the paramese (9) provides the arithmetic mean.

Figure 55.

This famous Pythagorean "harmonia"—also described in varying forms by Nicomachus, Aristides Quintilianus, Iamblichus, and others—provides a perfect paradigm for music as an embodiment of rational numerical order and, by extension, universal order. Soterichus emphasizes this point with a quotation from Aristotle:

> Harmonia is heavenly, having a godlike, beautiful, and divine nature. Being by nature fourfold in function, it has two means, arithmetic and harmonic, and its parts, magnitudes, and excesses appear in accord with number and equal measure. Mele are rhythmized in two tetrachords.[17]

Soterichus adds that this harmonia comprises the natures of the Unlimited (i.e., even number), the Limited (odd number), and the Even-Odd: even, in respect to the presence of four terms (12, 9, 8, and 6), two of which, 12 and 8, are themselves even; odd, in respect to the number 9; and even-odd, in respect to the number 6. These definitions are typical of Pythagorean mathematics as preserved in Aristotle's *Physica* 3.4 (203a4–16) and *Metaphysica* 1.5 (985b23–987a28), Euclid's *Elementa* 7, Nicomachus's *Introductio*

---

[17] *Eudemus* fr. 47: ἡ δ' ἁρμονία ἐστὶν οὐρανία, τὴν φύσιν ἔχουσα θείαν καὶ καλὴν καὶ δαιμονίαν· τετραμερὴς δὲ τῇ δυνάμει πεφυκυῖα, δύο μεσότητας ἔχει, ἀριθμητικήν τε καὶ ἁρμονικήν, φαίνεταί τε τὰ μέρη αὐτῆς καὶ τὰ μεγέθη καὶ αἱ ὑπεροχαὶ κατ' ἀριθμὸν καὶ ἰσομετρίαν· ἐν γὰρ δυσὶ τετραχόρδοις ῥυθμίζεται τὰ μέλη (1139b [Ziegler 19.21–26]). Cf. Nicomachus *Introductio arithmetica* 2.29 and *Manuale harmonices* 6 and 8–9; Gaudentius *Harmonica introductio* 11–12; Aristides Quintilianus *De musica* 3.3–6 and 24; and Iamblichus *In Nicomachi arithmeticam introductionem*.

arithmetica 1.7–10, and Theon of Smyrna's *Expositio rerum mathematicarum*.[18]

While the meanings of "even" and "odd" are still familiar in modern arithmetic, the other term, even-odd, echoes the complex definitions of numbers developed by Greek mathematics. Plato (*Parmenides* [143d–144a]), in addition to defining simple even and odd numbers, conjectures numbers that are evenly-even, oddly-even, oddly-odd, and evenly-odd. Euclid (*Elementa* 7.defs. 6–10) provides more precise definitions: an even number is one divisible into two equal parts; an odd number, one not divisible into two equal parts (or, an even number plus 1); an evenly-even number, one measured by an even number an even number of times; an evenly-odd number, one measured by an odd number an even number of times; and an oddly-odd number, one measured by an odd number an odd number of times. He does not define the oddly-even number, perhaps because it would be identical to the evenly-odd number. Theon of Smyrna (*Expositio rerum mathematicarum*), however, presents more complex explanations. After defining prime numbers as numbers that can be measured only by 1, he states that they are also called oddly-odd numbers. Among the even numbers, he defines the evenly-even numbers as those that are the product of even numbers and have entirely even parts (e.g., 32, 64, 128, etc.); the evenly-odd numbers, those measured by 2 and any odd number (e.g., 6, 10, 14, etc.); the oddly-even, those that are the product of any two numbers—one odd and the other even—and can be divided by 2 (e.g., 12 and 20). Thus, 6 is an evenly-odd number under any of the definitions because it is the product of an odd number (3) and the even number 2. Under Theon of Smyrna's stricter definition, 12 should be considered an oddly-even number, but under Euclid's more general definitions, it could be considered even ($12 \div 2 = 6$), evenly-odd ($4 \times 3 = 12$), or evenly-even ($2 \times 6 = 12$). Soterichus, in any case, defines 12 as an even number.

All this leads the Plutarchean Soterichus to one of his principal points: music is elevating, instructive, and useful. As such, it forms an essential part of Greek paideia. With this preliminary conclusion, he resumes his elaboration on Lysias's earlier discussion of the history of Greek music, showing how many of the modern musical innovations have led music into its present low estate. In consequence, "if one wishes to use music beautifully and with discrimination, let him copy the ancient style; furthermore, let him supplement it with other disciplines; let him appoint philosophy as a tutor, for it is sufficient to judge the proper measure and use of music."[19]

---

[18] Useful and extended discussions of Pythagorean mathematics and music may be found in André Barbera, "Persistence of Pythagorean Mathematics in Ancient Musical Thought" (Ph.D. dissertation, University of North Carolina at Chapel Hill, 1980); and Heath, *Greek Mathematics*, 1:65–117.

On this premise—and no doubt following Aristoxenus, the principal source for this section[20]—, Soterichus quickly reviews the disciplines of harmonics and rhythmics, noting that they alone are inadequate for the formation of judgments about the ethical character of music. Rather, the larger critical perception of the mind, drawing on a sharp sense of hearing, understands the continuity of effects and forms judgments about the nature and ethos of music. Although Soterichus's review merely echoes details of the surviving sections of Aristoxenus's *Harmonica* and *Rhythmica*,[21] it does illustrate that the underlying philosophical position of Aristoxenus's treatises was not entirely lost on later writers who used and developed his material.

Soterichus draws his speech to a close with a quotation from the famous hymn to Apollo (*Iliad* 1.472–74). Onesicrates then concludes the dialogue with an extension of Soterichus's philosophical position.[22] On the authority of the Pythagoreans, Archytas, Plato, and the rest of the ancient philosophers, Onesicrates observes that music is of special value because without music, the revolution of the universe and the motion of the stars neither come into being nor are established, for god has arranged everything in accord with harmonia. With the introduction of this important theme, which will return with Aristides Quintilianus and the neo-Platonists, Onesicrates dismisses the banqueters.

---

[19] Εἰ οὖν τις βούλεται μουσικῇ καλῶς καὶ κεκριμένως χρῆσθαι, τὸν ἀρχαῖον ἀπομιμείσθω τρόπον, ἀλλὰ μὴν καὶ τοῖς ἄλλοις αὐτὴν μαθήμασιν ἀναπληρούτω, καὶ φιλοσοφίαν ἐπιστησάτω παιδαγωγόν· αὕτη γὰρ ἱκανὴ κρῖναι τὸ μουσικῇ πρέπον μέτρον καὶ τὸ χρήσιμον (1142c–d [Ziegler 27.16–20]).

[20] One passage (1143e) is almost an exact quotation of the Introduction to Aristoxenus's *De principiis* (see pp. 301–4 *supra*).

[21] Cf. Aristoxenus *Harmonica* (da Rios 35.9–37.4, 41.4–44.9, and 66.1–68.9); see pp. 309, 314–16, and 322–24 *supra*.

[22] τὴν γὰρ τῶν ὄντων φορὰν καὶ τὴν τῶν ἀστέρων κίνησιν οἱ περὶ Πυθαγόραν καὶ Ἀρχύταν καὶ Πλάτωνα καὶ οἱ λοιποὶ τῶν ἀρχαίων φιλοσόφων οὐκ ἄνευ μουσικῆς γίγνεσθαι καὶ συνεστάναι ἔφασκον· πάντα γὰρ καθ' ἁρμονίαν ὑπὸ τοῦ θεοῦ κατεσκευάσθαι φάσιν (1147a [Ziegler 37.14–19]). For the hymn to Apollo, see p. 29 *supra*.

Cleonides

The clearest and most concise summary of the technical details of Aristoxenus's *Harmonica* is preserved in the *Harmonica introductio* now commonly attributed to Cleonides. In view of Aristoxenus's obvious disdain for the Harmonicists' purely abstract technical descriptions and his assessment of harmonics as merely preliminary to the larger and more important issues of musical logic and comprehension, it is one of the historical ironies that the general content of Cleonides's treatise began to be taken—perhaps soon after it was written—as providing a reasonably complete and coherent view of "ancient Greek music theory." In fact, it presents no more than the basic technical system that by the time of the Hadrianic revival had come to be regarded as Aristoxenian. Like the products of most revivals, this system was only an imperfect representation of the fullness and sophistication of Aristoxenus's theory. Nevertheless, much more of his theory is lost today than must have been the case in the first centuries C.E., and the representation provided by Cleonides's treatise does fill some of the lacunae in the surviving source material. It is therefore a valuable work, even in this limited context.

Nothing is known of Cleonides; his name is never cited by any other early author, although large portions of his treatise are appropriated by the Byzantine musicographer Manuel Bryennius in his *Harmonica*, written around 1300 C.E. As already noted, the *Harmonica introductio* is transmitted together with the *Sectio canonis* in thirty-two manuscripts: in eleven of them, the treatise is ascribed to Cleonides;[23] in eighteen, to Euclid; in one, to Zosimus; and in Vaticanus gr. 191, which is actually a composite of three manuscripts, the treatise appears in two of them but without any authorial ascription. It is now commonly assumed that the ascription to Euclid was projected onto the *Harmonica introductio* by its association with the *Sectio canonis* as the latter gradually became "Euclidean" in the course of its evolution. But the principal reasons for ascribing the treatise to Cleonides rather than

---

[23] In one of these, Parisinus gr. 3027 (*RISM BXI*, **101**), the treatise has no title and the ascription to Cleonides is in a later hand.

Euclid are two simple facts: first, the treatise does not seem especially "Euclidean"; and second, the name of Cleonides is assigned to the treatise in one of the two earliest and most important collections of ancient Greek music theory, the twelfth-century manuscript Vaticanus gr. 2338. In the other collection, Venetus Marcianus gr. app. cl. VI/3, however, the treatise is ascribed to Euclid.[24]

The question of authorship becomes more complex when it is enlarged to include the other versions of the treatise. In addition to the version existing in tandem with the *Sectio canonis*, ten manuscripts preserve a version of the treatise that omits the first three sentences and begins Φθόγγος μὲν οὖν ἐστὶ φωνῆς; six manuscripts contain a version enlarged by interpolations from the treatises of Aristides Quintilianus, Aristoxenus, and Bryennius; and one manuscript preserves the version normally found in tandem with the *Sectio canonis* but in this case without it. The first of these versions is headed in eight of the manuscripts as "an excerpt from the works of Pappus" (ἐκ τῶν τοῦ Πάππου), while two of them have no heading; in every case, this version follows an excerpt from the musical section of Theon of Smyrna's *Expositio rerum mathematicarum*. The second of these versions is attributed to Euclid in four of the manuscripts, while in two of them, it is specifically titled as anonymous. The final single exemplar is attributed to Zosimus.[25]

---

[24] On the relationship of the *Harmonica introductio* to the *Sectio canonis*, see pp. 344–46 *supra*, and Jon Solomon, "Cleonides: ΕΙΣΑΓΩΓΗ ΑΡΜΟΝΙΚΗ; Critical Edition, Translation, and Commentary" (Ph.D. dissertation, University of North Carolina–Chapel Hill, 1980), 162–74. For full descriptions of Vaticanus gr. 191 and 2338 and Venetus Marcianus gr. app. cl. VI/3, see Mathiesen, *RISM BXI*, **214**, **234**, and **270**. For an early study on Cleonides, see Karl von Jan, *Die Harmonik des Aristoxenianers Kleoneides* (Landsberg: Schäffer, 1870); the most important modern studies are Solomon, "Cleonides"; idem, "Vaticanus gr. 2338" (see chapter 4, n. 17); idem, "Ven. Marc. gr. 322 and the MSS. of the Pseudo-Euclidean ΕΙΣΑΓΩΓΗ ΑΡΜΟΝΙΚΗ," *Classica et mediaevalia* 37 (1986): 137–44; and idem, "The Manuscript Sources for the Aristides Quintilianus and Bryennius Interpolations in Cleonides' ΕΙΣΑΓΩΓΗ ΑΡΜΟΝΙΚΗ," *Rheinisches Museum für Philologie* 130 (1987): 360–66. For a comprehensive list of editions and translations of the treatise, see the Bibliography under "Cleonides" and "Euclid."

[25] For full descriptions of these manuscripts and the versions they contain, see Mathiesen, *RISM BXI*: for the first of the three versions, **41** (no heading), **89**, **158**, **176** (no heading), **201**, **219**, **234**, **238**, **253**, and **255**; for the second, **109**, **114**, **183** (attributed to Anonymous), **228**, **229**, and **282** (attributed to Anonymous); and for the Zosimus attribution, **240**.

Altogether then, the *Harmonica introductio* survives in one form or another in forty-nine manuscript copies contained in thirty-nine different codices. Or, in other words, ten of the codices contain the treatise twice. Nine of these contain both the "Pappus" version and the version in tandem with the *Sectio canonis*; the tenth is the composite manuscript, Vaticanus gr. 191.

The extremely unusual feature of multiple copies of the same treatise in the same codex, even given the slight difference between the "Pappus" and the tandem versions, attests to its complex textual history and the difficulty of ever assigning a specific author or date to the treatise. For the historical reasons outlined earlier and inasmuch as the title εἰσαγωγή (*introductio*) does not seem to have been used as a title prior to the first century B.C.E., it is quite unlikely the author could be Euclid. If the author were Pappus, the distinguished Alexandrian mathematician, the treatise could be as late as the first part of the fourth century C.E., that is to say, contemporary with the treatises of Aristides Quintilianus, Bacchius Geron, and Alypius. In comparison with the style and approach of Pappus's other mathematical commentaries, this seems unlikely and all but impossible. If the treatise were by Zosimus, at least nineteen potential authors—ranging from the first century B.C.E. to the ninth century C.E.—might present themselves.[26] But the attribution to Zosimus almost certainly comes through a transposition of the subscription to the *Sectio canonis* on f. 17r in Venetus Marcianus gr. app. cl. VI/3, in which it is stated that Zosimus corrected the text in Constantinople.[27] Whether or not Cleonides was the author, the simple, straightforward style of the treatise and its content would suggest that it was written no earlier than the second and no later than the fourth century C.E.

---

[26] For a list and brief overview of authors with this name, see Barbera, *Division of the Canon*, 9–13.

[27] The subscription is repeated in seven other manuscripts (see *RISM BXI*, **17**, **39**, **86**, **154**, **249**, **255**, and **264**). See Barbera, *Division of the Canon*, 36–37 and 185, n. 73.

Echoing Aristoxenus's *Harmonica,* Cleonides's treatise begins with simple definitions of the subject and the seven Aristoxenian categories of harmonics. Each of these is then developed in order. The following outline illustrates the arrangement, with parenthetical references relating each section to the surviving sections of Aristoxenus's *Harmonica*: *DP* indicates *De principiis;* and *EH1* or *EH2* indicate the respective book of the *Elementa harmonica* (references to the page and line numbers of Karl von Jan's edition are provided in brackets[28]). Where the material of the *Harmonica introductio* matches surviving portions of Aristoxenus's *Harmonica,* the content is clearly based on the earlier treatise, which must have existed at that time in a form more complete than was known by the date of the earliest surviving manuscript sources. The *Harmonica introductio* is not, however, a patchwork of verbatim excerpts or a paraphrase; rather, the author has attempted to summarize in a systematic fashion each of the categories in order to provide the most straightforward presentation of the "harmonic science" (ἁρμονικὴ ἐπιστήμη). Thus, the parenthetical references in this outline are intended only to show the extent to which Cleonides's treatments follow Aristoxenus's topics.

---

[28] Jan's edition has been used in this outline because of its ready availability. The edition in Solomon's dissertation ("Cleonides," 114–44) and the extended commentary on the treatise should, however, be used if available.

Cleonides, *Harmonica introductio*

- I. Introduction to Harmonics [Jan 179.3–180.10]
  - A. Definition of Harmonics (*DP* I/A)
  - B. The Seven Parts of Harmonics (*DP* VIII, XII; *EH1* I/B)
    - 1. note (φθόγγος)
    - 2. interval (διάστημα)
    - 3. genus (γένος)
    - 4. scale (σύστημα)
    - 5. tonos (τόνος)
    - 6. modulation (μεταβολή)
    - 7. melic composition (μελοποιία)
- II. Motion of the Voice [Jan 180.11–181.11] (*DP* III–VI)
  - A. Speaking/Continuous
  - B. Singing/Intervallic
    - 1. pitch (τάσις)
    - 2. interval
    - 3. stretching, loosening (ἄνεσις, ἐπίτασις)
    - 4. height, depth (βαρύτης, ὀξύτης)
    - 5. notes
- III. Genera [Jan 181.12–182.3] (*DP* XII, XIV; *EH1* IV/C)
  - A. Definitions
  - B. Diatonic
  - C. Color
  - D. Harmonia
- IV. Notes [Jan 182.4–187.2] (*DP* VIII, XIV; *EH1* IV)
  - A. Diatonic
  - B. Color
  - C. Harmonia
  - D. Mixture of Genera
  - E. Stationary and Movable
    - 1. stationary
    - 2. movable
- V. Intervals [Jan 187.3–189.8] (*DP* IX, XIII; *EH1* III)
  - A. Distinctions of Intervals
  - B. Magnitude
  - C. Genus
  - D. Consonant, Dissonant
  - E. Compound, Simple
  - F. Rational, Irrational
- VI. Genera of Melos [Jan 189.9–190.5] (*DP* XII, XIV; *EH1* II, IV)
  - A. Definitions
    - 1. diatonic
    - 2. chromatic
    - 3. enharmonic
    - 4. common
    - 5. mixed
  - B. Positions of Lichanos and Parhypate
- VII. Shades of Genera [Jan 190.6–193.2] (*DP* XIV; *EH1* IV)
  - A. Definition of Shades
  - B. Harmonia
  - C. Chromatic
    - 1. mild color
    - 2. hemiolic
    - 3. whole-tone
  - D. Diatonic
    - 1. mild diatonic
    - 2. intense diatonic
  - E. Representation by number
- VIII. Scales [Jan 193.3–202.5] (*DP* X; *EH1* V; *EH2* I)
  - A. Distinctions of Scales
  - B. Magnitude
  - C. Genus
  - D. Consonant, Dissonant
    - 1. consonant scales
    - 2. dissonant scales
    - 3. forms of consonant scales
      - a. fourth
      - b. fifth
      - c. octave

- E. Rational, Irrational
- F. Gapped, Continuous
- G. Conjunct, Disjunct
  - 1. three conjunctions
  - 2. one disjunction
  - 3. two Perfect Systems
    - a. lesser
    - b. greater
  - 4. one Immutable System
- H. Modulating, Non-modulating
  - 1. single (scales with one mese)
  - 2. not single (scales with two or more mesai)
  - 3. function of the mese

IX. Tonos [Jan 202.6–204.18] (*DP* II/P; *EH1* I/B/7)

- A. Definitions
- B. Note
- C. Interval
- D. Position of the Voice
- E. Pitch

X. Modulation [Jan 204.19–206.18] (*DP* II/P; *EH1* I/B/8)

- A. Definitions
- B. Genus
- C. Scale
- D. Tonos
- E. Melic Composition

XI. Melic Composition [Jan 206.19–207.7] (*EH1* I/B/9

- A. Definitions
- B. Sequence
- C. Succession
- D. Repetition
- E. Prolongation

XII. Miscellaneous Definitions [Jan 8.15]

- A. Diagram
- B. Function
- C. Melic Composition

A comparison of the two treatises reveals that the *Harmonica introductio* is a reliable—albeit highly simplified—representation of Aristoxenus's technical descriptions. While this may suggest that Cleonides's treatments of the categories no longer surviving in Aristoxenus's *Harmonica*—especially tonoi, modulation, and melic composition—can fill the lacunae, certain cautions must be kept in mind. First, in the course of simplifying and summarizing Aristoxenus's theory, Cleonides's treatments strip away the characteristic language, the theoretical subtleties, and the larger philosophical considerations that are so central to Aristoxenus's purpose. At most, the *Harmonica introductio* can provide only a faint reflection of Aristoxenus's original theory. Second, where treatments of the same category survive in both treatises, it would appear that for the purpose of clarification, Cleonides added material that may not have been in Aristoxenus's original treatment. For example, the section on notes provides a comprehensive list of all the Greek note names in the Immutable System, and it is clear that Aristoxenus thought such a list unnecessary.[29] An addition of this sort does not alter any technical point, but it does indicate that similar sorts of additions might have been made in places where Cleonides's treatment cannot be checked against Aristoxenus's original. The *Harmonica introductio* certainly preserves valuable information about the Aristoxenian tradition, but it should not be regarded as a substitute for the authority of Aristoxenus's own text.

---

[29] See p. 311 *supra*.

In the first sentence of his treatise, Cleonides implicitly recalls Aristoxenus's treatise in his definition of harmonics:

> Harmonics is the theoretical and practical science having to do with the nature of the harmonious. And the harmonious is made up of notes and intervals having a certain order.

Constant reference to "the nature" (ἡ φύσις) of a topic under discussion is typical of Aristoxenus's treatises, and although Aristoxenus's own definition of this subject is much more elaborate and fully developed, it is easy to see how a later writer might reduce it to this simple definition. Cleonides's subsequent definitions of the seven parts of harmonics are equally straightforward reductions of Aristoxenus's more complex treatments:

> A note is a melodic incidence of the voice upon one pitch.
> An interval is bounded by two notes differing as to height and depth.
> Genus is a certain division of four notes.
> A scale is made up of more than one interval.
> A tonos is any position of the voice, receptive of a scale, and without breadth.
> Modulation is the transposition of a similar thing to a dissimilar position.
> Melic composition is the employment of the materials subject to harmonic practice with due regard to the requirements of each of the subjects under consideration.[30]

With minor variations, most of these definitions are repeated by later theorists such as Gaudentius, Aristides Quintilianus, Nicomachus, Theon of Smyrna, and Bacchius Geron, who also develop them along the lines followed by Cleonides in the subsequent sections of his treatise.

---

[30] Φθόγγος μὲν οὖν ἐστι φωνῆς πτῶσις ἐμμελὴς ἐπὶ μίαν τάσιν.
Διάστημα δὲ τὸ περιεχόμενον ὑπὸ δύο φθόγγων ἀνομοίων ὀξύτητι καὶ βαρύτητι.
Γένος δέ ἐστι ποιὰ τεττάρων φθόγγων διαίρεσις.
Σύστημα δέ ἐστι τὸ ἐκ πλειόνων ἢ ἑνὸς διαστημάτων συγκείμενον.
Τόνος δέ ἐστι τόπος τις τῆς φωνῆς δεκτικὸς συστήματος ἀπλατής.
Μεταβολὴ δέ ἐστιν ὁμοίου τινὸς εἰς ἀνόμοιον τόπον μετάθεσις.
Μελοποιΐα δέ ἐστι χρῆσις τῶν ὑποκειμένων τῇ ἁρμονικῇ πραγματείᾳ πρὸς τὸ οἰκεῖον ἑκάστης ὑποθέσεως (Jan 179.9–180.10 [cf. Solomon 114.1.9–115.2.9]).
For a complete translation of the treatise, see "Cleonides, *Harmonic Introduction*," in *Strunk's Source Readings in Music History*, vol. 1, *Greek Views of Music*, ed. Thomas J. Mathiesen (New York: Norton, 1998), 35–46.

The definitions of sections II (motion of the voice) and III (genera) quite clearly reflect surviving sections of Aristoxenus's *Harmonica*, as shown in the outline, and both sections provide clear illustrations of the extent to which Cleonides reduces Aristoxenus's complex investigations to a series of formulaic precepts. Section II conveys in brief the Aristoxenian differentiations among continuous and intervallic motion of the voice, stretching and loosening, height and depth, pitch, and note,[31] while section III reduces Aristoxenus's complex measurements and definitions of the genera into the simple patterns commonly repeated over the subsequent centuries: in descending order, the diatonic genus progresses by tone, tone, and semitone; the chromatic by trisemitone, semitone, and semitone; and the enharmonic by ditone, diesis, and diesis; ascending order is the reverse in each case.[32] Like Aristoxenus, Cleonides employs at this point the generic terms "diatonic," "color," and "harmonia." The adjectival "chromatic" and "enharmonic" are typically reserved for references to specific genera of melos or the various shades.

Section IV begins with a comprehensive listing of all the names of the notes in the Immutable System, first in the diatonic genus, then in the chromatic and enharmonic genera. A composite list, by "a mixing of the genera," is then provided. No such list appeared in Aristoxenus's *Harmonica* because he could assume his audience's familiarity with this sort of technical terminology.[33] Cleonides's treatise, by contrast, as the product of historical scholarship, cannot make any such assumptions. Moreover, Cleonides is interested in systematizing the material of harmonics insofar as possible, and he therefore expands on his list of notes by defining each of them as movable or immovable and as contained within a pycnon or not; those within a pycnon are further classified as the bottom, middle, or top note of the pycnon. While Aristoxenus did distinguish between movable and immovable notes, he was not much interested in providing comprehensive classifications of notes, which he would have considered irrelevant apart from a musical context. The following tabulation illustrates Cleonides's definitions.[34]

---

[31] See pp. 304–5 *supra.*

[32] See pp. 312–13 and 324 *supra.*

[33] See p. 311 *supra.*

Proslambanomenos (im, ap)	[a]		
Hypate hypaton (im, bp)	[b]		
Parhypate hypaton (mp) [or, if enharmonic, b*]	[c']		
Enharmonic lichanos hypaton (tp)	[c']		
Chromatic lichanos hypaton (tp)	[c♯']		
Diatonic lichanos hypaton (ap)	[d']		
Hypate meson (im, bp)	[e']		
Parhypate meson (mp) [or, if enharmonic, e*']	[f']		
Enharmonic lichanos meson (tp)	[f']		
Chromatic lichanos meson (tp)	[f♯']		
Diatonic lichanos meson (ap)	[g']		
Mese (im, bp)	[a']		
Paramese (im, bp)	[b']	Trite synemmenon (mp) [or, if enharmonic, a*']	[b♭']
Trite diezeugmenon (mp) [or, if enharmonic, b*']	[c"]	Enharmonic paranete synemmenon (tp)	[b♭']
Enharmonic paranete diezeugmenon (tp)	[c"]	Chromatic paranete synemmenon (tp)	[b']
Chromatic paranete diezeugmenon (tp)	[c♯"]	Diatonic paranete synemmenon (ap)	[c"]
Diatonic paranete diezeugmenon (ap)	[d"]	Nete synemmenon (im, ap)	[d"]
Nete diezeugmenon (im, bp)	[e"]		
Trite hyperbolaion (mp) [or, if enharmonic, e*"]	[f"]		
Enharmonic paranete hyperbolaion (tp)	[f"]		
Chromatic paranete hyperbolaion (tp)	[f♯"]		
Diatonic paranete hyperbolaion (ap)	[g"]		
Nete hyperbolaion (im, ap)	[a"]		

---

[34] In the following table, the various classifications are given in parentheses: immovable notes are marked im (all other notes are movable), notes not part of a pycnon are marked ap, and notes that form the bottom, middle, or top of a pycnon are marked bp, mp, and tp. The conventional pitch applied to each note by current scholarship is provided in brackets (an asterisk represents the basic pitch raised by a diesis).

Theorists such as Aristides Quintilianus will provide detailed explanations of the meaning of each note- and tetrachord-name, but Cleonides seems to be concerned simply with establishing the names and order of the notes.

Section V provides one of the more comprehensive summaries of Aristoxenus's material: the same five distinctions of intervals are presented, each with one or two simple examples.[35] Like the other sections, however, section V avoids any consideration of the larger context typical of Aristoxenus's treatment. Once again, Cleonides's definitions can be easily reduced to tabular form.

Distinction by	Definition or example
Magnitude	which intervals are larger and which smaller (e.g., ditone, tone, semitone, fourth, fifth, octave, etc.).
Genus	which intervals are diatonic, chromatic, or enharmonic.
Consonance and dissonance	consonant intervals are the fourth, fifth, octave, and the like (consonant notes make a blend [κρᾶσις] of sound); dissonant intervals are all those less than a fourth and any intervals between the consonant intervals (e.g., diesis, semitone, tone, ditone, tritone, quadratone, quintatone, etc.; dissonant notes do not blend and sound rough to the ear).[36]

---

[35] See pp. 306–7, 310–11, and 324–25 *supra*.

[36] The surviving portions of Aristoxenus's treatises do not include the observation that consonant notes blend while dissonant do not. The observation does, however, appear in the introduction to the *Sectio canonis* (see p. 347 *supra*), and it is repeated in a short passage attributed to Aelian the Platonist (fl. second or third centuries C.E.), quoted by Porphyrius (Düring 96.8–10) in his commentary to Ptolemy's *Harmonica*.

Simple and compound	simple intervals are bounded by consecutive notes (e.g., hypate and parhypate, lichanos and mese); compound intervals are bounded by non-consecutive notes (e.g., mese and parhypate, mese and nete); some intervals can be either simple or compound, depending on the genus (e.g., the semitone is compound in the enharmonic but simple in the chromatic and diatonic; the tone is compound in the chromatic but simple in the diatonic; the ditone is simple in the enharmonic but compound in the chromatic and diatonic, etc.); every interval smaller than a semitone is simple and every interval larger than a ditone is compound.
Rational and irrational	rational intervals have defined magnitudes (e.g., tone, semitone, ditone, tritone, etc.); irrational intervals are rational intervals reduced or enlarged by an irrational interval.

The definition of rational and irrational intervals particularly distinguishes Cleonides from the Pythagoreans. For Aristoxenians, the distinction between rational and irrational is primarily one of function: if an interval (or a rhythmic pattern) is known and employed within musical phenomena, it is rational; otherwise, it is irrational. For Pythagoreans, however, rationality is a matter of expressible numerical relationships (e.g., 3:2, 4:3, 2:1, etc.): if an interval can be expressed in such a relationship, it is rational; if not, it is irrational, even though—like the various sizes of Aristoxenus's semitones—it may be employed in practice.[37]

Sections VI and VII, on the genera and the shades, present a very clear summary of Aristoxenus's definitions of the six generic shades of melos: the enharmonic; the mild, hemiolic, and whole-tone chromatic; and the mild and intense diatonic. Cleonides also refers—as had Aristoxenus—to the possibility of mixed or common melos, but unlike Aristoxenus, he adds short definitions: a mixed melos is one in which characteristics of two or three of the genera appear; a common melos, one in which only the immovable notes are used.[38] Cleonides then specifies the ranges of the movable notes and presents their positions within each of the shades, using Aristoxenus's terminology of tones, half-tones, third-tones, and quarter-tones. Following this, the positions are presented a second time in numerical equivalents, with the tone divided into twelve equal parts. These calculations are clearly derived from Aristoxenus's prose presentation, which compares the various sizes of semitones with the common measure of the twelfth-tone, but Aristoxenus himself never specifically presents the shades in numerical terms.[39] Indeed, Cleonides may be the first theorist to have calculated the numerical equivalents from Aristoxenus's prose. In view of his interest in methodically elucidating Aristoxenus's technical points, it seems remarkable Cleonides does not specify that his sequence of intervals is ascending. Certainly, his audience could infer this from the context, but Cleonides is normally very meticulous about such details. In any event, his patterns are as follows (they may be conveniently envisioned as ascending from hypate to mese):

---

[37] See pp. 339–40 (and n. 104) and 346–47 *supra*.

[38] Cleonides: κοινὸν δὲ τὸ ἐκ τῶν ἑστώτων συγκείμενον. μικτὸν δὲ τὸ ἐν ᾧ δύο ἢ τρεῖς χαρακτῆρες γενικοὶ ἐμφαίνονται, οἷον διατόνου καὶ χρώματος ἢ διατόνου καὶ ἁρμονίας ἢ χρώματος καὶ ἁρμονίας ἢ καὶ διατόνου καὶ χρώματος καὶ ἁρμονίας (Jan 189.14–18 [cf. Solomon 125.11.14–18]); Aristoxenus: πᾶν μέλος ἔσται ἤτοι

Harmonia	3 + 3 + 24
Mild color	4 + 4 + 22
Hemiolic color	4½ + 4½ + 21
Whole-tone color	6 + 6 + 18
Mild diatonic	6 + 9 + 15
Intense diatonic	6 + 12 + 12

A simple comparison with figure 51 (p. 313) will show that at their fixed points, these dimensions are identical to Aristoxenus's. Theorists such as Nicomachus, Ptolemy, Aristides Quintilianus, Gaudentius, Bacchius Geron, and the Byzantine Manuel Bryennius repeat similar mechanical descriptions of the genera, sometimes in prose, sometimes with numerical equivalents. It is important to note, however, that Aristoxenus takes some pains in his treatise to dispel any sense that the six shades are defined by fixed points. Rather, his points are intended to mark off ranges within which the movable notes may fall according to the coloration of the music. The actual positions of the notes are potentially unlimited. Cleonides alludes to this by specifying the ranges of the movable notes, but in codifying Aristoxenus's theory, he once again

---

διάτονον ἢ χρωματικὸν ἢ ἐναρμόνιον ἢ μικτὸν ἐκ τούτων ἢ κοινὸν τούτων (da Rios 55.10–11).

[39] See pp. 311–13 and 325–26 *supra*.

strips away the subtle distinctions Aristoxenus tries to make about the function of the genera in analyzing musical phenomena.

Section VIII provides a very full description of the types of scales and their various distinctions. Some of this material clearly parallels surviving portions of Aristoxenus's *Harmonica*, but as the second book of the *Elementa harmonica* is truncated in its discussion of scales, it remains uncertain whether all the material is derived directly from Aristoxenus or from other sources. In any case, the material of section VIII does address the distinctions Aristoxenus outlined in the *Harmonica* (*De principiis*, section X): magnitude; consonant or dissonant; genus; rational or irrational; conjunct, disjunct, or combined; gapped or continuous; and single, double, or multiple—or, in Cleonides's terms, modulating and non-modulating. In the surviving portions of the *Elementa harmonica*, however, the discussion is confined almost entirely to the tetrachord, and Aristoxenus clearly considered the fourth and the fifth, not the octave, to be the basic musical scales. While Cleonides does devote a considerable portion of section VIII to enumerating the species of the fourth and fifth, even more attention is paid to the seven octave species. As Aristoxenus criticized his predecessors for their simple enumeration of the species of the octave, it is difficult to feel confident that this portion of Cleonides's treatise is an accurate representation of the lost sections of Aristoxenus's own work.[40]

Cleonides's definitions can be presented in tabular form.

Distinction by	Definition or example
Magnitude	lesser or greater scales (e.g., octave, tritone, fifth, fourth, etc.).
Genus	scales are diatonic, chromatic, or enharmonic.
Consonant or dissonant	six consonant scales exist in the Immutable System: fourth (2½ tones), fifth (3½ tones), octave (6 tones), octave-and-a-fourth (8½ tones), octave-and-a-fifth (9½ tones), double octave (12 tones); two others extend beyond the Immutable System: double-octave-and-a-fourth ([14½ tones]), double-octave-and-a-fifth ([15½ tones]). Dissonant scales are all those smaller than a fourth and any scales between the stated consonant scales.

---

[40] See pp. 307–11 and 326–34 *supra*.

Rational or irrational	rational scales are composed of rational intervals (i.e., tone, semitone, ditone, tritone, etc.); all other scales are irrational.
Gapped or continuous	scales composed of consecutive notes are continuous; those omitting some number of possible notes are gapped.
Conjunct or disjunct	conjunct scales link tetrachords together by common notes; disjunct scales are composed of tetrachords of similar form, separated by a tone of disjunction in the middle.
Modulating or non-modulating	modulating scales have two or more mesai; non-modulating scales have only a single mese.

The first two distinctions are clear and require no comment. The third distinction is certainly Aristoxenian in its acceptance of all the octave compounds—extending to the double-octave-and-a-fifth—as consonances; the Pythagoreans, of course, would reject the octave-and-a-fourth and the double-octave-and-a-fourth as consonant because these larger intervals could not be expressed as multiple or superparticular ratios. No doubt the double-octave-and-a-fourth and the double-octave-and-a-fifth would also be rejected because their ratios could not be expressed with the numbers of the tetraktys of the decad.[41] In addition, Cleonides follows Aristoxenus in defining these intervals in terms of the number of tones they contain, clearly ignoring the Pythagorean ratios. He specifies that the "conjunct system"—that is, the Lesser Perfect System—extends only to the fourth consonant scale, and employing the note-names, he provides an example for the span of each scale.

Before proceeding to describe the remaining distinctions, Cleonides provides an extended listing of the "forms" (σχήματα) of the first three consonant scales: the fourth, the fifth, and the octave. Aristoxenus referred to the "forms" as "species" just before the truncation of the second book of the *Elementa harmonica*, but then, apparently anticipating some confusion, added that his term was synonymous with "form."[42] Cleonides uses both terms in this section, but the fact that he seems to prefer the term "form"—and, as already noted, devotes so much space to the enumeration of the species of the octave—suggests that this material may not be entirely derived from Aristoxenus. Nevertheless, these sorts of descriptions of scalar species become common in the treatises of the next several centuries: Nicomachus, Gaudentius, Ptolemy, Aristides Quintilianus, Bacchius Geron, Bryennius, and others describe at least some of the species articulated by Cleonides.[43]

---

[41] See pp. 310 (and n. 46), 324–25, and 346–47 (and n. 119) *supra*.

[42] See p. 333 (and n. 93) *supra*.

Scale	Species	Examples
Fourth	three species: in Harmonia and Color, bounded by either the bottom, middle, or top notes of a pycnon; in the Diatonic (numbers representing tones), either ½ + 1 + 1; 1 + 1 + ½; or 1 + ½ + 1.	hypate hypaton–hypate meson (b–e'), parhypate hypaton–parhypate meson (c'–f'), or lichanos hypaton–lichanos meson (d'–g').
Fifth	four forms: in Harmonia and Color, bounded by either the bottom note of a pycnon with the tone of disjunction at the top, the middle note of a pycnon with the tone of disjunction second from the top, the top note of a pycnon with the tone of disjunction third from the top, or the bottom note of a pycnon with the tone of disjunction fourth from the top; in the Diatonic, either ½ + 1 + 1 + 1; 1 + 1 + 1 + ½; 1 + 1 + ½ + 1; or 1 + ½ + 1 + 1.	hypate meson–paramese (e'–b'), parhypate meson–trite diezeugmenon (f'–c''), lichanos meson–paranete diezeugmenon (g'–d''), or mese–nete diezeugmenon (a'–e'').

---

[43] See Barbera, "Octave Species," 229–41.

Octave	seven species: in Harmonia and Color, bounded by either the bottom note of a pycnon with the tone of disjunction either at the top, fourth from the top, or first from the bottom (i.e., the first, fourth and seventh species); the middle note of a pycnon with the tone of disjunction either second or fifth from the top (i.e., the second and fifth species); or the top note of a pycnon with the tone of disjunction either third or sixth from the top (i.e., third and sixth species); in the Diatonic, either ½ + 1 + 1 + ½ + 1 + 1 + 1; 1 + 1 + ½ + 1 + 1 + 1 + ½; 1 + ½ + 1 + 1 + 1 + ½ + 1; ½ + 1 + 1 + 1 + ½ + 1 + 1; 1 + 1 + 1 + ½ + 1 + 1 + ½; 1 + 1 + ½ + 1 + 1 + ½ + 1; or 1 + ½ + 1 + 1 + ½ + 1 + 1.	hypate hypaton–paramese (b–b'), called "Mixolydian"; parhypate hypaton–trite diezeugmenon (c'–c"), called "Lydian"; lichanos hypaton–paranete diezeugmenon (d'–d"), called "Phrygian"; hypate meson–nete diezeugmenon (e'–e"), called "Dorian"; parhypate meson–trite hyperbolaion (f'–f"), called "Hypolydian"; lichanos meson–paranete hyperbolaion (g'–g"), called "Hypophrygian"; or mese–nete hyperbolaion (a'–a"), called "Locrian" and "Hypodorian."

In his discussion of the species of the octave, Cleonides applies an ethnic name to each species, in addition to his specification of its structure and typical bounding notes. Aristoxenus, by contrast, seems to associate these names with their misapplication to the tonoi by the Harmonicists.[44] Although Cleonides may have derived his descriptions of the octave species from some early sources, he probably did not find this material in Aristoxenus's *Harmonica*.[45]

Having completed his treatment of the forms, Cleonides returns to the remaining distinctions among scales. The fourth and fifth distinctions (see the tabulation on p. 379) are clear and self-explanatory. In the sixth distinction, however, Cleonides offers descriptions of the so-called Greater and Lesser Perfect Systems. Aristoxenus alluded to these in passing, without providing any detail on their composition.[46] Likewise, the *Sectio canonis* locates fifteen notes of the Immutable System but otherwise says nothing about its construction. These scale forms must have been standard by the fourth century B.C.E., but the earlier theorists seem largely to have taken them for granted. It was left to later theorists—including Cleonides, Nicomachus, Gaudentius, Aristides Quintilianus, Ptolemy, Bacchius, and Bryennius—to codify the technical nomenclature of the two systems and their composite tetrachords that has become such an essential part of modern descriptions of "ancient Greek music theory."

---

[44] See pp. 322–23 *supra.*

[45] For a consideration of the relationship between Cleonides's descriptions and Aristoxenus's treatise, see Jon Solomon, "Towards a History of *Tonoi,*" *Journal of Musicology* 3 (1984): 242–51.

[46] In section II/M of *De principiis,* Aristoxenus merely observes that "it is necessary to speak of the arrangement of scales from intervals (both the others

Cleonides begins by defining conjunction (συναφή), that is, the linking of two similar tetrachords by a common tone.[47] Three conjunctions exist, which he names "lowest," "middle," and "highest." The lowest conjunction links the hypaton and meson tetrachords (i.e., b–e' and e'–a'), the middle links the meson and synemmenon tetrachords (i.e., e'–a' and a'–d"), and the highest links the diezeugmenon and hyperbolaion tetrachords (i.e., b'–e" and e"–a"). There is also disjunction (διάζευξις) between the proslambanomenos and the hypate hypaton and between the mese and the paramese. The Lesser Perfect System extends from the proslambanomenos through the lowest and middle conjunctions to the nete synemmenon, while the Greater Perfect System extends from the proslambanomenos through the lowest conjunction, across the disjunction, and through the highest conjunction to the nete hyperbolaion. The Lesser Perfect System, which has the range of an octave-and-a-fourth, therefore contains three conjunct tetrachords: hypaton, meson, and synemmenon; while the Greater Perfect System, which has the range of a double octave, contains four: two conjunct pairs—hypaton and meson, and diezeugmenon and hyperbolaion—separated by a disjunction. The hypaton and meson tetrachords are common to both systems, while the other tetrachords are distinctive of their respective systems. Finally, the Immutable System is a composite of the Greater and Lesser Perfect Systems.

---

and the Perfect), showing from these how many there are and what their nature is ..." (περὶ τῶν συστάντων ἐξ αὐτῶν συστημάτων λεκτέον περί τε τῶν ἀλλῶν καὶ τοῦ τελείου, ἐξ ἐκείνων ἀποδεικνύντας πόσα τ' ἐστὶ καὶ ποῖ' ἄττα ... [da Rios 10.11–13]).

[47] The table on p. 374 illustrates the complete arrangement of all the notes in each tetrachord and may assist the reader in following this paragraph.

It is impossible to know to what extent this description represents earlier theoretical conceptions of a scalar superstructure for ancient Greek music. If this structure was known to the Harmonicists and theorists such as Aristoxenus, it seems to have been important primarily as a framework for nomenclature.

The final distinction of scales as modulating or non-modulating is only briefly addressed in Cleonides's *Harmonica introductio*. Aristoxenus had referred to the distinction of scales as single, double, or multiple, and Cleonides's definition makes it clear that the distinction is based on the number of "functional" mesai within a scale. Cleonides offers very little explanation about the function of the mese, but he does specify that the mese governs the functions of all the other notes: "It is from the mese that the functions of the remaining notes are recognized, for how each of them functions becomes apparent in relation to the mese."[48] The importance of the mese is confirmed by the Aristotelian *Problemata* 19.20 (919a13–28), which observes that if the mese is altered after the strings of an instrument have been tuned, the entire melody will sound disharmonious when the instrument is played; if, however, any of the other notes is altered, only the altered note will sound awry. The *Problemata* explains this peculiarity by stating that "all good mele" (πάντα γὰρ τὰ χρηστὰ μέλη) use the mese more frequently than any of the other notes, adding that the mese—like the grammatical conjunction "and"—is a kind of musical conjunction. *Problemata* 19.36 (920b7–15) further hypothesizes that the mese is so important because all the other strings of the instrument are tuned to it. Both statements are reasonable: the mese is not only an immovable note—and therefore well suited to govern the tuning of an instrument—but also the "pivot" note from which the scale may ascend either through another conjunct tetrachord—the synemmenon—or across the tone of disjunction and into the diezeugmenon tetrachord. Several notes might function as mese, depending on the placement of whole-tones and semitones in a scale and its range. In fact, such shifts of mesai can be seen in a number of the musical fragments,[49] and these would presumably fit Cleonides's definition of "modulating" scales.

---

[48] ἀπὸ δὲ τῆς μέσης καὶ τῶν λοιπῶν φθόγγων αἱ δυνάμεις γνωρίζονται, τὸ γὰρ πῶς ἔχειν ἕκαστον αὐτῶν πρὸς τὴν μέσηνς φανερῶς γίνεται (Jan 202.3–5 [Solomon 138.24.3–5]).

Cleonides returns to the important subject of "function" at the very end of his treatise (section XII), where three short definitions are added. The second of these states: "Function is the order of the note in the scale; or, function is the order of the note, through which we recognize each of the notes."[50] Aristoxenus himself refers to function on a number of occasions, stressing that notes, intervals, or rhythmic feet, for example, do not have intrinsic functions but rather are perceived by the intellect to have a certain function depending on the context.[51] While Cleonides's definitions are more mechanical, they are close to Aristoxenus's point. The most detailed discussion of function in terms of systematic music theory is offered by Ptolemy in his *Harmonica* 2.5, where an elaborate nomenclature of notes "by position" (κατὰ θέσιν) and "by function" (κατὰ δύναμιν) is developed. While Ptolemy's system can be applied to the surviving pieces of Greek music, the extent to which it was recognized by other theorists remains uncertain.[52]

With the completion of his treatment of the various distinctions of scales, Cleonides turns in section IX to a consideration of tonos. The topic, of course, forms a part of the outline of Aristoxenus's *Harmonica*, but as the second book of the *Elementa harmonica* is truncated prior to its discussion of tonos, it is difficult to determine how much of Cleonides's material is derived directly from Aristoxenus and how much from other sources.

Cleonides begins section IX by observing that the term "tonos" (τόνος) is used in four ways: to refer to a note, an interval, a position of the voice, and a pitch. He then provides short fragments by Terpander and Ion to illustrate the first usage and passes quickly over the obvious second usage. The passage from Terpander refers to the abandonment of an older style using only four tones in favor of a new style with seven tones played on the phorminx.

---

[49] See, for example, the earlier discussions of the Delphic paeans and the fragment from Euripides's *Iphigenia Aulidensis* on pp. 55 and 115 *supra*.

[50] Δύναμις δὲ ἐστι τάξις φθόγγου ἐν συστήματι, ἢ δύναμις ἐστι τάξις φθόγγου, δι' ἧς γνωρίζομεν τῶν φθόγγων ἕκαστον (Jan 207.10–12 [Solomon 143.29.10–144.29.12]).

[51] See pp. 306–8, 314, 318, 326–27, 331–33, 338–40, and especially 321–24 *supra*.

[52] On Ptolemy's discussion, see pp. 459–63 *infra*.

The passage from Ion is more complex and subject to varying interpretations: it refers to an eleven-stringed lyre arranged in ten steps with three concordant paths of harmonia, in contrast to an earlier lyre capable of producing only seven tones arranged in fourths. This is not the place for an extended interpretation of these passages, which is, in any event, irrelevant to Cleonides's purpose: he introduces them simply as examples of the respective musical styles of the seventh and fifth centuries B.C.E.[53]

Cleonides's use of the phrase "position of the voice" clearly echoes Aristoxenus's *Harmonica*. In section II of *De principiis*, Aristoxenus hinted at the close relationship between scales, positions of the voice, and the tonoi, but the sections of the *Elementa harmonica* in which this subject would have been developed do not survive. Nevertheless, it seems quite clear that Aristoxenus regarded position of the voice and tonos as complementary but not synonymous. Cleonides, however, follows his usual practice of reducing Aristoxenus's theory to a simpler form. For him, the positions of the voice are the various tonoi, and he attributes thirteen of them to Aristoxenus:

Hypermixolydian, also called Hyperphrygian;
Two Mixolydians, a higher and a lower, of which the higher is also called Hyperiastian, the lower Hyperdorian;
Two Lydians, a higher and a lower, of which the lower is also called Aeolian;
Two Phrygians, a higher and a lower, of which the lower is also called Iastian;
One Dorian;
Two Hypolydians, a higher and a lower, the latter also called Hypoaeolian;
Two Hypophrygians, of which the lower is also called Hypoiastian;
Hypodorian.[54]

---

[53] On Terpander, see pp. 59, 61, 63, 66, 70, 74, 145, 245, 251, and 274 *supra*; and on his association with seven strings, pp. 245–47. For a new discussion of the Ion fragment, see Maas, "*Polychordia* and the Fourth-Century Greek Lyre." See also Ugo Duse, "La lira di Ione di Chio," *Quaderni urbinati di cultura classica* n.s. 4 (1980): 113–23; Levin, "The Hendecachord of Ion of Chios"; and Théodore Reinach, "Un fragment d'Ion de Chios," *Revue des études grecques* 14 (1901): 8–19.

[54] Ὑπερμιξολύδιος καὶ ὑπερφρύγιος καλούμενος·
μιξολύδιοι δύο, ὀξύτερος καὶ βαρύτερος, ὧν ὁ ὀξύτερος καὶ ὑπεριάστιος καλεῖται, ὁ δὲ βαρύτερος καὶ ὑπερδώριος·
λύδιοι δύο, ὀξύτερος καὶ βαρύτερος, ὧν ὁ βαρύτερος καὶ αἰόλιος καλεῖται·
φρύγιοι δύο, ὀξύτερος καὶ βαρύτερος, ὧν ὁ βαρύτερος καὶ ἰάστιος καλεῖται·
δώριος εἷς·

Cleonides adds that the Hypermixolydian is higher than the Hypodorian by an octave, and each of the tonoi begins one half-tone lower than its predecessor. Although Cleonides does not offer any notation to support his presentation, the later notational tables of Alypius do show just such an arrangement. If the conventional pitching were applied to this arrangement, the tonoi could be displayed as in figure 56.

			Proslambanomenos
Hypermixolydian (or Hyperphrygian)			f
High and low Mixolydian	Hyperiastian		e
	Hyperdorian		e♭
High and low Lydian	Lydian		d
	Aeolian		c♯
High and low Phrygian	Phrygian		c
	Iastian	octave	B
Dorian			B♭
High and low Hypolydian	Hypolydian		A
	Hypoaeolian		G♯
High and low Hypophrygian	Hypophrygian		G
	Hypoiastian		F♯
Hypodorian			F

Figure 56.[55]

ὑπολύδιοι δύο, ὀξύτερος καὶ βαρύτερος, ὃς καὶ ὑποαιόλιος καλεῖται· ὑποφρύγιοι δύο, ὧν ὁ βαρύτερος καὶ ὑποιάστιος καλεῖται· ὑποδώριος (Jan 203.7–204.8 [Solomon 139.25.7–140.26.8]).

[55] The pitching applied by convention to the tonoi in the tables of Alypius (i.e., F–g) does not, unfortunately, coincide with the conventional pitching normally applied to abstract descriptions of the notes in the Immutable System (i.e., a–a"). Both pitchings have been selected by modern scholars simply as a way of keeping most of the various Greek notes on the modern musical staff when they are represented in modern musical notation. It should always be kept in mind, however, that the modern "pitch equivalents" applied throughout this chapter and in other publications have no absolute pitch meaning. They are supplied

If each tonos were extended from the proslambanomenos to the nete hyperbolaion, its range would be two octaves. Thus, the overall range spanned by the lowest note of the Hypodorian tonos and the highest note of the Hyperphrygian tonos would be three octaves.

Cleonides attributes this arrangement to Aristoxenus, but in section I/B/7 of the *Elementa harmonica,* Aristoxenus derides the Harmonicists' arrangement of the tonoi, an arrangement quite similar to Cleonides's presentation.[56] It is therefore very difficult to accept this as an accurate representation of Aristoxenus's own treatment. It is much more likely that Cleonides has either borrowed such an arrangement from an earlier "Aristoxenian" treatise or, as he seems to have done elsewhere in his treatise, inadvertently conflated material from a Harmonicist treatise with authentic material from Aristoxenus. On the other hand, Aristides Quintilianus presents a similar definition of the tonoi in *De musica* 1.10, where he adds that "younger theorists" expanded Aristoxenus's thirteen tonoi to fifteen by adding Hyperaeolian and Hyperlydian at the top; in fact, just such a set of fifteen tonoi is preserved in the tables of Alypius.[57]

The fourth usage of tonos—that is, as "pitch"—is related to position of the voice and certainly recalls Aristoxenus. Cleonides does not take tonos as simply synonymous to "a pitch" but rather as conveying the sense of "a higher or lower or intermediate tone of voice."[58]

In sections X–XI of the *Harmonica introductio,* Cleonides takes up the final two topics of Aristoxenian harmonics: modulation and melic composition. Here, too, it is difficult to determine how closely this material follows Aristoxenus, whose own discussion of the topics does not survive. In his outline of the *Elementa harmonica* (section I/B/8), Aristoxenus simply states:

> it will be necessary to speak about modulation: first, what is this "modulation" and how it arises—I am speaking of a certain effect that hap-

---

simply in the interest of making the relationships easier for modern musicians to visualize.

[56] See pp. 301–2 and 322–23 *supra.*

[57] For a full diagram of the Alypian tonoi, see p. 599 *infra.*

[58] καθ' ὅ φαμεν ὀξυτονεῖν τινα ἢ βαρυτονεῖν ἢ μέσῳ τῷ τῆς φωνῆς τόνῳ κεχρῆσθαι (Jan 204.16–18 [Solomon 141.26.16–18]).

> pens in the order of melody—, then, how many modulations there are in all and from how many intervals. ...
>
> Last of the parts is to speak about melic composition itself. Since among the notes themselves there are no differences and so many and divergent bodies of melos can arise from the same notes, it is evident that this should arise from use. We call this "melic composition."[59]

Cleonides's treatments certainly follow the structure of an Aristoxenian demonstration. He begins by articulating four types of modulation: in genus, scale, tonos, and melic composition. The first two types are self-evident, and Cleonides says little, beyond observing that a melody can shift from one genus to another and scales can shift back and forth from conjunction to disjunction.[60] On the subject of modulation in tonos, he states that modulation can occur from any one of the thirteen tonoi to any of the others. This means that a modulation can involve shifting the tonos by as little as a semitone or as much as an octave. Modulations involving shifts of a consonant interval (for example, from the Dorian to the Hyperdorian tonos or from the Phrygian to the Hypophrygian tonos) or a whole-tone (for example, from the Dorian to the Phrygian tonos or from the Phrygian to the Lydian tonos) are the more musical. As to the others, the more pitches in common between the two tonoi, the more musical the modulation, "because it is necessary for every modulation to contain some common note, interval, or scale."[61] The tables of Alypius indeed show that tonoi related by a whole-tone, fourth, fifth, or octave have more notes in common than tonoi related by other intervals.

Modulation in melic composition, according to Cleonides, is a matter of shifting from one ethos (ἦθος) to another. He refers to three types: diastaltic (διασταλτικόν), or elevating; systaltic (συσταλτικόν), or depressing; and hesychastic (ἡσυχαστικόν), or soothing. Cleonides associates diastaltic melos with a sense of magnificence, manly elevation of the soul, and heroic deeds; this type of melos was used in tragedy. Systaltic melos conveys a feeling of dejection and unmanliness suitable both to lamentation and eroticism, while hesychastic melos—as the term itself implies—evokes a feeling of quietude and peacefulness suitable to hymns and paeans. Descriptions of these three types of ethos also appear in Aristides Quintilianus's *De musica* and Bryennius's *Harmonica*, the latter clearly borrowed from Cleonides's treatise.[62] Cleonides's simple three-fold distinction of ethos would seem to be merely an attempt to describe melos in general as exalting, soothing, or depressing, and the possibility of shifting from one mood to another within a composition. Although Aristoxenus employs the term "ethos" on a few occasions in passing, no three-fold classification of types of ethos survives in his *Harmonica*, and it seems unlikely it ever formed a part of this work.[63]

---

[59] περὶ μεταβολῆς ἂν εἴη λεκτέον, πρῶτον μὲν αὐτὸ τί ποτ' ἐστὶν ἡ μεταβολὴ καὶ πῶς γιγνόμενον—λέγω δ' οἷον πάθους τινὸς συμβαίνοντος ἐν τῇ τῆς μελῳδίας τάξει—, ἔπειτα πόσαι εἰσὶν αἱ πᾶσαι μεταβολαὶ καὶ κατὰ πόσα διαστήματα ... Τελευταῖον δὲ τὸ περὶ αὐτῆς τῆς μελοποιΐας ⟨εἰπεῖν⟩. ἐπεὶ γὰρ ἐν τοῖς αὐτοῖς φθόγγοις ἀδιαφόροις οὖσι τὸ καθ' αὐτοὺς πολλαί τε καὶ παντοδαπαὶ μορφαὶ μελῶν γιγνονται, δῆλον ὅτι παρὰ τὴν χρῆσιν τοῦτο γένοιτ' ἄν. καλοῦμεν δὲ τοῦτο μελοποιΐαν (da Rios 47.18–48.8).

[60] Cleonides does not specify that the mese is the pivot for shifting from conjunct to disjunct patterns, but this is apparent from his earlier discussion of scales (see pp. 383–84 *supra*).

[61] ἐπειδὴ ἀναγκαῖον πάσῃ μεταβολῇ κοινόν τι ὑπάρχειν ἢ φθόγγον ἢ διάστημα ἢ σύστημα (Jan 205.18–19 [Solomon 142.27.18–19]).

When Cleonides comes to the subject of melic composition itself, a subject of great potential interest, it is disappointing that he has almost nothing to say: melic composition is the use of everything described in the previous sections. He then names and briefly describes four types of musical gestures used in composition: sequence (ἀγωγή), succession (πλοκή), repetition (πεττεία), and prolongation (τονή). In sequence, the melody moves up or down by successive notes; in succession, the notes outline a sequence of parallel intervals moving up or down (e.g., c–e–d–f–e-g–f–a or c–f–d–g–e–a or other comparable patterns); and in repetition and prolongation, a note is either repeated or sustained. Aristides Quintilianus offers somewhat fuller definitions of sequence, succession, and repetition, perhaps derived from the same source, but they do not provide a much clearer sense of the gestures. Nevertheless, the differentiations are typical of Aristoxenus: all melodic patterns must either move up or down, repeat the same pitch, or sustain a pitch. If the melody moves up or down, it does so either through sequential notes or by a series of skips. Aristoxenus perhaps developed these differentiations in his characteristic manner, but even if Cleonides had access to a now-lost authentic treatment by Aristoxenus himself, his own treatise would doubtless have reduced it to the purely technical descriptions of the sort found in this section.

---

[62] Aristides Quintilianus describes the three types somewhat more briefly, but his definitions are substantially identical to Cleonides's. In the section on harmonics (*De musica* 1.12), Aristides Quintilianus refers to a "medial" rather than a hesychastic ethos, but when the three types are noted again in the section on rhythmics (1.19), he does employ the term "hesychastic." The diastaltic and systaltic ethoses are also mentioned in Ptolemy's *Harmonica* 3.11 (see p. 488 *infra*), where he relates the vertical movement of the stars to the genera of harmonics. Astrological associations of this sort are typical of the third books of both Ptolemy's *Harmonica* and Aristides Quintilianus's *De musica*. For a study of the three terms, see Solomon, "Diastaltic Ethos."

[63] The fullest treatment of musical ethos appears in Aristides Quintilianus's *De musica*; see pp. 541–54 *infra*.

Although Cleonides's *Harmonica introductio* is at best only a highly abbreviated epitome, it is nonetheless a valuable supplement to the surviving fragments of Aristoxenus's theory. Moreover, it is quite apparent that later Greek theorists and modern scholars even to the present day draw heavily—albeit perhaps indirectly—from Cleonides's treatise for their own descriptions of "ancient Greek music theory." Cleonides's *Harmonica introductio* is therefore a fundamental source in its own right for the intellectual tradition of this theory. Still, it is apparent that a good deal of his material cannot be confirmed in any source earlier than the second century C.E. While the scholars of the Hadrianic revival certainly possessed more material from the preceding centuries than survives today, it is impossible to determine all their sources—let alone evaluate their authority. By the time of Cleonides, the music and music theory about which he wrote had lost the force of a living tradition and were in the process of becoming fixed as a subject of scholarship.

Nicomachus of Gerasa

If Cleonides's *Harmonica introductio* stands as one of the best examples of an "Aristoxenian" treatise, the *Manuale harmonices* ('Αρμονικῆς ἐγχειρίδιον) of Nicomachus is a prime example of the resilience of the Pythagorean tradition in later Greek music theory. Nicomachus's *Manuale* is not, however, exclusively Pythagorean; rather, it represents the conflation of Aristoxenian and Pythagorean elements typical of several of the Greek musical treatises written in the second, third, and fourth centuries C.E. Writers of this period—and not only music theorists—are nothing if not eclectic.

Nicomachus is better known than many of the other Greek musical theorists, though not so well known as Aristoxenus or Ptolemy. His most famous work, the *Introductio arithmetica* (Ἀριθμητικὴ εἰσαγωγή), seems to have been regarded in late antiquity and the early Middle Ages as a work of great importance in preserving the fundamentals of Pythagorean number theory. As such, it was the subject of numerous later commentaries and translations. Apuleius of Madaura (b. ca. 123, d. after 170 C.E.) was the first to translate the treatise into Latin, and a few centuries later, it was translated anew by Boethius.[64] In view of the complexity of the task, Apuleius probably could not have completed his translation much earlier than 150 C.E., and this date provides a reasonable *terminus ante quem* for Nicomachus's floruit. For its part, the short *Manuale harmonices*, which refers to the famous Alexandrian astrologer Thrasyllus, was probably written after the astronomer's death in 36 C.E. With these two *termini*, it is reasonable to suppose that Nicomachus lived at the end of the first and the beginning of the second century C.E.[65]

In addition to the two complete works of Nicomachus surviving today, there was a work on the mystical properties of numbers (Θεολογούμενα ἀριθμητικῆς) and most probably a longer work on music, perhaps an *Introductio musica* (Μουσικὴ εἰσαγωγή). Nicomachus himself refers in the *Manuale harmonices* to his intention of writing a longer *introductio* in several books, and parts of this work may survive in the texts preserved in a number of manuscripts as a *Manuale harmonicum* (Ἁρμονικὸν ἐγχειρίδιον)—the "second book" of the *Manuale harmonices*.[66] It has been argued persuasively by Calvin M. Bower that the substance of this longer work is represented in the first four books of Boethius's *De institutione musica*, and the surviving *Manuale harmonicum*, together with the material attributed to Nicomachus by Boethius, provides strong evidence that he did, in fact, complete this project.[67] Likewise, parts of the work on numbers are preserved today in a compilation attributed to the neo-Platonist Iamblichus, although the attribution is probably false.[68]

---

[64] According to Cassiodorus *Institutiones* 2.7: "reliquae vero quae sequuntur ... indigent arithmetica disciplina. quam apud Graecos Nicomachus diligenter exposuit. hunc prius Madaurensis Apuleius, deinde magnificus vir Boethius Latino sermone translatum Romanis contulit lectitandum" (*Cassiodori senatoris Institutiones*, ed. R. A. B. Mynors [Oxford: Clarendon, 1961], 140.15–20). Apuleius's translation does not survive, but Boethius's does. In addition, Iamblichus, Asclepius Trallianus, Ioannes Alexandreas Philoponus, and Proclus wrote commentaries on Nicomachus's *Arithmetica*. The fact of two Latin translations within the span of approximately 350 years would alone attest to the importance of Nicomachus's work.

[65] The fullest study of Nicomachus's *Manuale* is Flora R. Levin, *The Harmonics of Nicomachus and the Pythagorean Tradition*, American Classical Studies, no. 1 (University Park, Penn.: The American Philological Association, 1975). See also her "Nicomachus. Manual of Harmonics. Translation and Commentary" (Ph.D. dissertation, Columbia University, 1967), published in a revised edition as *The Manual of Harmonics of Nicomachus the Pythagorean* (Grand Rapids, MI: Phanes Press, 1994); Barbera, "Pythagorean Mathematics," 162–73; Heath, *Greek Mathematics*, 1:97–112; and Dillon, *Middle Platonists*, 352–61.

Nicomachus's *Manuale harmonices* survives in thirty-nine manuscripts, five of which preserve it together with the *Arithmetica*. Unlike the *Sectio canonis* and the *Harmonica introductio* attributed to Cleonides, both of which have competing attributions, the *Manuale harmonices* is firmly assigned to Nicomachus by all the manuscript sources, which describe it as having been "dictated extemporaneously in accord with the ancient style."[69] In twenty-eight of the manuscripts, the so-called *Manuale harmonicum* follows the *Manuale harmonices*. It never appears without the preceding work, but in nine of the manuscripts, the *Manuale harmonicum* is divided into two separate parts, the second—and longer—part simply titled "by the same Nicomachus" (τοῦ αὐτοῦ Νικομάχου) or as a scholion on the text (Σχόλιά τινα εἰς τὸν αὐτόν).[70] Since this second part refers to Nicomachus by name, it must indeed have been a scholion that was subsequently absorbed into a collection of Nicomachean fragments. The first part, however, might very well contain authentic material by Nicomachus himself. The title of the two parts together, *Manuale harmonicum*, could either have been extended from the first part to encompass the whole, or a later scribe could have developed it by attraction from the preceding treatise, the *Manuale harmonices*, and applied it to an untitled collection of Nicomachean fragments and scholia.

---

[66] There is a slight shift in meaning between ἁρμονικῆς ἐγχειρίδιον (*Manuale harmonices*) and ἁρμονικὸν ἐγχειρίδιον (*Manuale harmonicum*), but it is of little significance in determining whether these two works form a unit or are separate. Some of the earliest manuscripts refer to the *Manuale harmonices* as ἁρμονικῆς ἐγχειρίδιον, while others refer to it as the ἁρμονικὸν ἐγχειρίδιον.

[67] See Bower, "Boethius and Nicomachus"; and Boethius, *Fundamentals of Music*, xxiv–xxix. For discussion of Boethius's role in the transmission of ancient Greek music theory to the Latin West, see chapter 7 *infra*.

[68] For a new English translation, see Robin Waterfield, trans., *The Theology of Arithmetic: On the Mystical, Mathematical and Cosmological Symbolism of the First Ten Numbers*, foreword by Keith Critchlow (Grand Rapids, Michigan: Phanes Press, 1988).

[69] The typical form of the title is: Νικομάχου Γερασηνοῦ Πυθαγορικοῦ ἁρμονικῆς ἐγχειρίδιον ὑπαγορευθὲν ἐξ ὑπογύου κατὰ τὸ παλαιόν. For a comprehensive list of editions and translations of the *Manuale harmonices*, see the Bibliography under "Nicomachus."

When the *Manuale harmonices* and *Manuale harmonicum* appear together in the manuscripts, with a single exception, the title of the former is slightly modified to indicate that it is the first of two books. The single exception is, as might be expected, one of the earliest manuscript collections of ancient Greek music theory, Venetus Marcianus gr. app. cl. VI/3. This famous manuscript has already been noted in connection with the treatises of Aristoxenus and Cleonides, the texts of which were copied onto the principal writing area of the pages in the twelfth century C.E. The Nicomachus texts, however, were added to the manuscript in the thirteenth century, copied into the margins and surrounding the twelfth-century text of Aristoxenus's *Harmonica*. In this instance, the *Manuale harmonices* is simply presented without any indication that it forms the "first book" of a larger work, and the *Manuale harmonicum* follows without its usual definition as the "second book."[71]

It is impossible to determine a specific relationship among these texts, which are certainly different in content, approach, and style. For purposes of this discussion, the *Manuale harmonices* will be treated as an integral work and the *Manuale harmonicum* will be considered separately as a collection of materials.

Manuale harmonices

In the first chapter of the *Manuale harmonices*, Nicomachus addresses himself to a noble woman who has requested that he provide a concise treatment of harmonics. He states that because he is traveling while composing the *Manuale*, his treatment must be simple and brief. The *Manuale*, it seems, is to be sent to the noble lady as soon as it is finished, but Nicomachus promises to write a subsequent and fuller treatment of the subject in several books when time permits. The longer treatment, however, will be sent to her only at some later time, "wherever I hear that you are living" (ἔνθα ἂν διάγειν ὑμᾶς πυνθανώμεθα). The identity of the lady remains unknown, but it is striking that she too seems to be traveling; her eventual place of residence is unknown to Nicomachus. If she, like Nicomachus, was from Gerasa, a Greek Palestinian city, perhaps both of them were fleeing the continuous conflicts between the Jews and the Gentiles, which eventually led to the destruction of more than 900 Palestinian towns by Hadrian's legions in the 130s C.E.

---

[70] This second part begins "Ὅτι Νικόμαχος τὴν ἀνωτάτην (Jan 271.16). The manuscripts that divide the *Manuale harmonicum* at this point are described in Mathiesen, *RISM BXI*, **7**, **9**, **38**, **50**, **124**, **133**, **155**, **275**, and **284**.

[71] For a full description of this manuscript (**270**) and all the other Nicomachus manuscripts, see ibid.

Whatever the biographical circumstances of Nicomachus's composition of the *Manuale*, the epistolary style of the treatise is nearly unique in ancient Greek music theory. Aristides Quintilianus addresses his friends Florentius and Eusebius at the very beginning of *De musica*, but the treatise itself is formal and complex; there is nothing epistolary or extemporaneous about it. Only Michael Psellus, nearly a millennium later than Nicomachus, used this style in his "letter on music," which may indeed have been a letter, most probably addressed to Emperor Constantine IX Monomachus. It is, of course, impossible to know whether Nicomachus actually composed the *Manuale* as a letter or whether the style is merely a literary affectation.

Overall, the *Manuale harmonices* is arranged in twelve chapters, each with a descriptive heading:

Chapter	Heading
1	That this *Manuale* is a memorandum of the elementary teaching of harmonics
2	On the two species of the voice—intervallic and continuous—and their positions
3	That the first music among sensible types is viewed with respect to the planets, while our music exists as an imitation of it
4	That the things pertaining to notes are organized by number
5	That Pythagoras, by adding an eighth string to the seven-string lyre, established the octave harmonia

6	How the arithmetic ratios of the notes were discovered
7	Concerning the division of the octave by the diatonic genus
8	Exegesis of the harmonic statements in the *Timaeus*
9	Evidence for the statements, derived from Philolaus
10	On the tuning of the notes through arithmetic ratios
11	On the double octave through the diatonic genus
12	On the progression and division of the notes by the three genera

After the introductory first chapter, Nicomachus begins in the second chapter with the common Aristoxenian distinctions among intervallic and continuous motion of the voice, position of the voice, and compass.[72] His treatment is brief, and in some cases, he seems to slightly misrepresent the Aristoxenian position. For instance, "position of the voice" for Nicomachus seems to mean a broader register occupied by the continuous or speaking voice and a narrower register occupied by the intervallic or singing voice, rather than the much more diverse and complex meanings—especially as a series of positions closely related to the tonoi—suggested by Aristoxenus himself and developed by a theorist such as Cleonides. For the speaking voice, Nicomachus has in mind a broad register defined not only by the up-and-down motion of the voice but also by the linear points where speaking begins and ends. For the singing voice, he seems to envision on the one hand the limitations provided by certain smallest and largest intervals and on the other hand the dynamic limitation of the softest audible sound. These conceptions differ somewhat from the Aristoxenian tradition, and it is noteworthy that Nicomachus attributes the distinctions of this chapter to "those of the Pythagorean school" (οἱ ἀπὸ τοῦ Πυθαγορικοῦ διδασκαλείου). No mention is made of Aristoxenus. Perhaps Nicomachus is simply appropriating and adapting this material in order to link it with the larger Pythagorean aim of his treatise, or perhaps Aristoxenus developed his own conceptions from an earlier Pythagorean source also known to Nicomachus. But it is more likely that Nicomachus regarded Aristoxenus as a Pythagorean: Aristoxenus's birthplace, Tarentum, was a Pythagorean center, his early training was in the Pythagorean tradition, and he wrote several books on the Pythagoreans. While a number of Aristoxenus's arguments in the *Harmonica* are at variance with traditional Pythagorean mathematics, this may not have disqualified him as a Pythagorean in the eyes of later adherents. Aristoxenus, after all, makes no explicit criticism of the Pythagoreans in the *Harmonica*; rather, his explicit criticism is reserved for the Harmonicists, who are clearly not Pythagoreans.

---

[72] Cf. sections II/P, III, and VII in Aristoxenus's *De principiis* (see pp. 300–301 *supra*).

Nicomachus builds on the concept of "position" (τόπος) in chapter 3 by relating the relative planetary positions to the relative positions of the notes in the heptachord bounded by the hypate and the nete (or, as Nicomachus calls it, neate). The planets—or, stars—actually produce pitches, according to the Pythagoreans, as they rotate through the ether, and Nicomachus develops the etymology of star (ἀστήρ) as something deprived of stasis (στάσεως ἐστερημένος). From the characterization of stars as always running (ἀεὶ θέων), the additional terms "ether" (αἰθήρ) and "god" (θεός) are derived.[73] Nicomachus then associates the seven stars of the Greek astronomical system with the notes as shown in figure 57. The name of each note is also given a short etymology. "Hypate" is derived from ὕπατον, which means "highest," and this accords with the fact that Kronos is the highest or most distant star with respect to the earth. Likewise, "neate" is derived from νέατον, which means "lowest," and this accords with the closeness of the Moon to the earth. The "mese," or "middle," accords with the Sun because it is the middle of the seven stars. The names of the remaining notes reflect their positions "beside" (παρα-) or "above" (ὑπερ-) these three principal notes, which bound two conjunct tetrachords. Later, in chapters 5 and 11, Nicomachus will explain how this heptachord was expanded into the octave and double octave.[74] For now, Nicomachus once again cites the press of time but promises his noble reader a fuller explanation of all these subjects in his subsequent treatise.

---

[73] On the "harmony of the spheres," see Aristotle *De caelo* 2.9. On the etymologies, cf. Plato *Cratylus* 397d and 409b–410b; and Aristotle *De caelo* 1.3 (270b24).

[74] A similar explanation of the meanings of the note names, but with somewhat different terms, appears in Aristides Quintilianus *De musica* 1.6. For a consideration of Nicomachus's scales in connection with the tuning of the lyre, see chapter 2, pp. 243–47 *supra*.

Nicomachus's first heptachord

fourth	d''	neate	Moon
	(c'')	paraneate	Aphrodite
	(b♭')	paramese	Hermes
	a'	mese	Sun
fourth	(g')	hypermese (or lichanos)	Ares
	(f')	parhypate	Zeus
	e'	hypate	Kronos

(Pitches in parentheses represent the possible diatonic tuning, but this is not specified by Nicomachus. As always, pitches follow the conventional modern pitching for the Greater Perfect System.)

Figure 57.

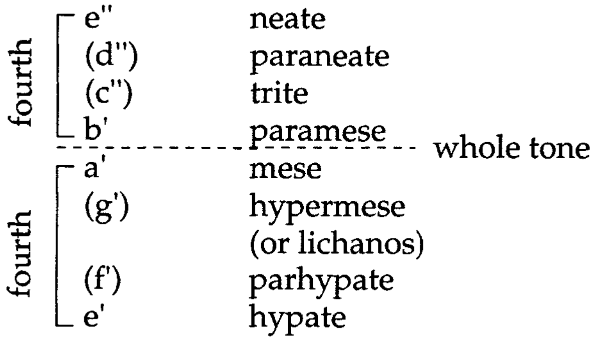
Chapter 4 introduces the common Pythagorean acoustic notions that sound is a beating of air which reaches the ear, and various sounds can therefore be explained and related to one another by the number of pulsations. Nicomachus's explanations, however, are somewhat unusual. He suggests that even intensity and timbre of sound are expressible as number: intensity is a matter of the number of parts of air under pulsation, while smooth and rough sounds are a matter of even and uneven pulsation. Rapid pulsation of course produces higher pitch, and slower pulsation lower pitch. A number of instruments are mentioned to show the different factors that affect pitch on wind and string instruments, but whatever the instrument, low and high pitch are the result of a lesser or greater number of pulsations.[75]

With the introduction of number as essential to the understanding of sound, Nicomachus is ready to explore in chapters 5–10 the expansion of the early heptachord into an octave and the various ratios that regulate the intervals within the octave. He begins by specifically attributing to Pythagoras the observation that the extremes of a musical scale ought to form the most perfect consonance, the octave, not the dissonance formed by the extremes of the heptachord. In order to accomplish this, Pythagoras did not propose adding an additional note to the top or bottom of the heptachord, perhaps because the extremes had already been identified as "highest" and "lowest." Rather, he added a new note beside the mese; this new note would be called "paramese," while the former paramese would now be called "trite" to indicate its position as the third note in the scale (see figure 58).

---

[75] On these acoustic observations, cf. the Aristotelian *De audibilibus* (for examples from this treatise, see chapter 2, pp. 185–86 and 215 *supra*) and the introduction to the *Sectio canonis* (pp. 346–47 *supra*).

Pythagoras's octochord



(Pitches in parentheses represent the possible diatonic tuning, but this is not specified by Nicomachus. Here again, pitches follow the conventional pitching for the Greater Perfect System.)

Figure 58.

Nicomachus does not refer to the tone between the mese and the paramese as a disjunction (διάζευξις) because he is not yet speaking of the various scale forms and indeed has not yet even identified the new upper tetrachord as the diezeugmenon. He does, however, observe the important role of this tone in forming the interval of a fifth, either between the hypate and the paramese or between the nete and the mese. Although he makes no reference to Aristoxenus, his consideration of the fifth as a scale and his emphasis on its importance echoes Aristoxenus's principle of "fourth and fifth notes."[76]

At the end of chapter 5, Nicomachus identifies in passing the ratio of the fifth as sesquialtera (i.e., 3:2), noting that it is composed of the sesquitertia fourth (4:3) and the sesquioctaval whole-tone (9:8). These basic Pythagorean ratios, which have already been encountered in the *Sectio canonis*, bring him in chapter 6 to the famous story of their discovery by Pythagoras while walking one day by a smithy.

---

[76] This is the principle that either every fourth note in a "musical" scale must form the consonance of a fourth or every fifth note the consonance of a fifth or both fourth and fifth notes their respective consonances. See pp. 316–17 and 329–31 *supra*.

The story of Pythagoras's discovery of the harmonic ratios is told and retold by many writers, Greek and Latin, with certain variations,[77] but its essence lies in the application of four numbers—12, 9, 8, and 6—to produce the Pythagorean "harmonia." Nicomachus's version has Pythagoras first detecting the consonant intervals of the octave, fifth, and fourth produced by the striking of hammers of certain weights; then, after concluding that the weight of each hammer is the distinctive factor in this phenomenon, he experiments with comparable weights by suspending them from identical and unison strings and discovers that the proportion among the weights is 12:9:8:6. The physical impossibility of this story was already recognized as early as Ptolemy's *Harmonica* 1.8, and in the version of Aristides Quintilianus (*De musica* 3.1), the experiment is not even attributed to Pythagoras. Nevertheless, Nicomachus uses it as a way of introducing the interlocking intervals already encountered in the Plutarchean Soterichus's description.[78] The phenomenon of the weights is then extended, simply by definition, to string tension, wind-column length, and percussion. Finally, Pythagoras is supposed to have filled these large consonant intervals with the smaller intervals of the diatonic genus.

In chapter 7, Nicomachus, once again recalling the principle of "fourth and fifth notes" but without specific reference to it, observes that if the heptachord or octochord should be measured sequentially by the interval of a fourth or fifth, moving from bottom to top, three patterns of whole-tones and semitones would appear in the fourth and four in the fifth.[79] He does not identify these as "species" or "forms" of the scales, as do Aristoxenus and the Aristoxenians, but this is yet another echo of the Aristoxenian tradition in Nicomachus's *Manuale harmonices.*

---

[77] For example, Iamblichus (*Vita Pythagorica* 115–120), Censorinus (*De die natali* 10), Macrobius (*Comm. in Somnium Scipionis* 2.1.8), Boethius (*De institutione musica* 1.10–11), Gaudentius (*Harmonica introductio* 11), Isidore of Seville (*Etymologiae* 3.16.1), and many later Latin writers. A useful survey of the ancient literature on this story is provided in Levin, "Nicomachus. Manual of Harmonics," 143–48.

[78] See figure 55 (p. 363 *supra*).

[79] Cleonides's description of these species, or "forms," is much more detailed than Nicomachus's; see the chart on pp. 380–81 *supra*.

Chapter 8 is devoted to an explication of the two means—arithmetic and harmonic—employed by Plato in the *Timaeus* to construct the Pythagorean "harmonia." Nicomachus begins with a paraphrase of Plato's description (*Timaeus* 36a–b) of the means:

> So, in each interval there are two means, one of these exceeding and exceeded by the same part of the extremes, and the other exceeding and exceeded by an equal number. He filled up the distance between the sesquialteran and sesquitertian distances with the leimma of the sesquioctave.[80]

To the usual definitions of the means, as presented by Plato and echoed by the Plutarchean Soterichus or Aristides Quintilianus, Nicomachus adds observations about the characteristics of the terms when subjected to various patterns of multiplication and addition. In the case of the harmonic mean, when it is multiplied by the sum of the extremes, it produces a number that is equal to twice the product of the extremes. The arithmetic mean, if doubled, will equal the sum of the extremes and, if squared, will exceed the product of the extremes by the square of the difference between the terms.[81] Nicomachus then refers to a "third mean," known as "ruling proportion" (κυριώτερος ἀναλογία), in which two middle terms form various ratios with the extremes and the product of the means is equal to the product of the extremes. This proportion is represented by 12:9:8:6, which embraces geometric proportion (12:8::9:6), harmonic proportion (12:8:6), and arithmetic proportion (12:9:6), as well as the whole-tone ratio, 9:8, the common measure of musical ratios and the difference between the fifth and the fourth.[82]

---

[80] ὥστε ἐν ἑκάστῳ διαστήματι δύο εἶναι μεσότητας, τὴν μὲν ταὐτῷ μέρει τῶν ἄκρων αὐτῶν ὑπερέχουσαν καὶ ὑπερεχομένην, τὴν δὲ ἴσῳ μὲν κατ' ἀριθμὸν ὑπερέχουσαν, ἴσῳ δὲ ὑπερεχομένην. ἡμιολίων δὲ καὶ ἐπιτρίτων διαστάσεων διάστασιν τῷ τοῦ ἐπογδόου λείμματι συνεπληροῦτο (Jan 250.6–11). The fact that Nicomachus paraphrases Plato rather than quoting him exactly has concerned some modern scholars (see, for example, Barker, *Greek Musical Writings,* 2:259, n. 60), but in fact the paraphrase perfectly fits Nicomachus's chapter, which begins with a description of the two means and ends with a description of the 9:8 interval as central to the "ruling proportion."

[81] In the harmonic proportion 12:8:6, the sum of the extremes is 18 and the product is 72; 18 multiplied by 8 produces 144, equal to twice 72. In the arithmetic proportion 12:9:6, the sum of the extremes is 18, equal to twice 9; 9 squared (81) exceeds the product of the extremes (72) by 9, the square of the difference (3) between the terms. These same observations are included respectively in Nicomachus *Introductio arithmetica* 2.25.4 and 2.23.5–6. Theon of Smyrna (*Expositio* [Hiller 113–119]) provides similar descriptions of the means (see pp. 426–27).

Like most authors of this period, Nicomachus is anxious to show that his statements are accurate representations of ancient authority. In chapter 9, then, he bolsters his descriptions with evidence derived from Philolaus, whom he identifies as a disciple of Pythagoras.[83] Nicomachus adds that other ancient authorities could be adduced to support his statements, but for now, the testimony of Philolaus will have to suffice. Inasmuch as Book III of Boethius's *De institutione musica* contains several additional references to Philolaus, as well as the Pythagoreans Eubulides and Hippasus, Nicomachus's longer book must have provided his noble lady with a fuller treatment of the subject.

Perhaps because of its unusual vocabulary,[84] Nicomachus departs from his usual practice of paraphrasing an author and proceeds to quote the following passage drawn from the first book of Philolaus's *Physica*:

> The magnitude of harmonia is "syllaba" and "dioxeian." Dioxeian is greater than syllaba by a sesquioctave. There is a syllaba from the hypate to the mese, a dioxeian from the mese to the neate. From the neate to the trite is a syllaba, and from the trite to the hypate a dioxeian. There is a sesquioctave between the trite and the mese, the syllaba is a sesquitertia, the dioxeian is a sesquialtera, and the octave is duple. So, harmonia is five sesquioctaves and two dieses; dioxeian is three sesquioctaves and a diesis; and syllaba is two sesquioctaves and a diesis.[85]

---

[82] The proportion is more fully described in his *Introductio arithmetica* 2.29. See figure 55 (p. 363 *supra*).

[83] Philolaus was born in Tarentum, the birthplace of Aristoxenus and an important center of Pythagoreanism. He was a contemporary of Socrates and therefore not an immediate disciple of Pythagoras. For a full examination of Philolaus, see Burkert, *Lore and Science.*

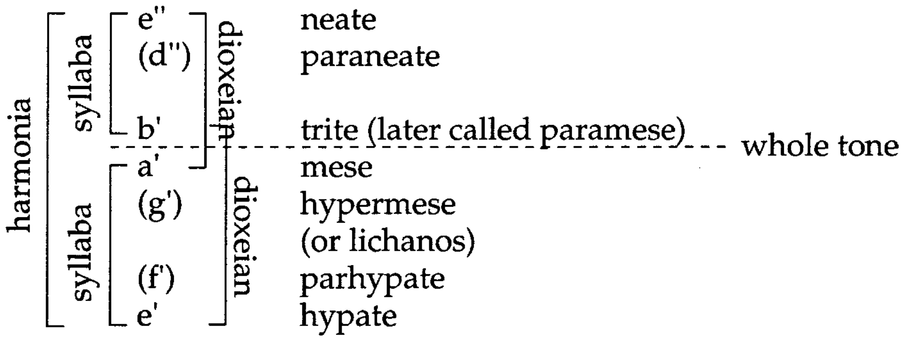
[84] The vocabulary of Philolaus's excerpt also appears in the writings of Thrasyllus and Aelian, brief passages of which are quoted by Porphyrius in his commentary on Ptolemy's *Harmonica* (Düring 96.21–23 and 96.29–97.9), and in Aristides Quintilianus's *De musica* 1.8 (W.-I. 15.8–11).

[85] ἁρμονίας δὲ μέγεθος συλλαβὰ καὶ δι' ὀξειᾶν. τὸ δὲ δι' ὀξειᾶν μεῖζον τᾶς συλλαβᾶς ἐπογδόῳ. ἔστι γὰρ ἀπὸ ὑπάτας εἰς μέσαν συλλαβὰ, ἀπὸ δὲ μέσας πότι νεάταν δι' ὀξειᾶν, ἀπὸ δὲ νεάτας ἐς τρίταν συλλαβά, ἀπὸ δὲ τρίτας ἐς ὑπάταν δι' ὀξειᾶν. τὸ δ' ἐν μέσῳ τρίτας καὶ μέσας ἐπόγδοον, ἁ δὲ συλλαβὰ ἐπίτριτον, τὸ δὲ δι' ὀξειᾶν ἁμιόλιον, τὸ διὰ πασᾶν δὲ διπλόον. οὕτως ἁρμονία πέντε ἐπογδόων καὶ δυοῖν διέσεοιν. δι' ὀξειᾶν τρί' ἐπόγδοα καὶ δίεσις, συλλαβὰ δὲ δύ' ἐπόγδοα καὶ δίεσις (Jan 252.17–253.3).

Recognizing the obscurity of this passage, Nicomachus explains that Philolaus's trite is equivalent to the paramese of a heptachord, separated from the paraneate by three semitones. As the heptachord was described in chapter 3 (see figure 57 *supra*), this would not be true, but Philolaus's scale has to be bounded by the octave of harmonia rather than the seventh of the old heptachord. He must therefore be referring to the pattern reflected in his description of the octochord provided in chapter 5 (see figure 58 *supra*). Prior to Pythagoras's supposed addition of the eighth note to create the full octochord, this scale could have been envisioned as a heptachord. If Nicomachus's description is correct, it would seem that the scale Philolaus is envisioning must have had only three notes in the upper syllaba, while the lower syllaba must have been a true tetrachord, once again containing the same notes described earlier in chapters 3 and 5 (see figure 59 *supra*).

When the new note was added, Nicomachus now suggests, it may not have been inserted between the mese and the trite, as was asserted in chapter 5,[86] but rather between the trite and paraneate, thereby making the upper syllaba a full tetrachord, parallel to the lower syllaba. With this new note, the trite would no longer have been the "third" note in the upper syllaba; its name was therefore changed to "paramese," and the new note, which was now "third" from the top, became the trite.

Philolaus's scale



(Pitches in parentheses represent the possible diatonic tuning, but this is not specified by Nicomachus. Here again, pitches represent the conventional pitching for the Greater Perfect System.)

Figure 59.

---

[86] There, however, the notes were called mese and paramese to accord with the earlier description of the heptachord in his chapter 3. See p. 398 *supra*.

To conclude his discussion of the relationship between music and numbers, Nicomachus returns in chapter 10 to the points he introduced in chapter 4. There, he suggested but did not precisely define the relationship between pitch and the pulsation of air; nevertheless, it was made clear that sound was regulated by number and could be measured in terms of specific numerical values. Now, he observes that these values are inversely related when applied to length and pulsation.

Nicomachus provides an example using the monochord. If a string is sounded, divided in half, and then sounded again, the second pitch will, of course, be an octave higher. Thus, its frequency must be double that of the whole string (2:1), but its length is only half (1:2). The same inverse relationship appears in the case of the sesquialtera and the sesquitertia, and to strengthen the force of his observation, he provides similar examples using the aulos and the syrinx. At the end of the chapter, he adds the remarkable observation that the size of the bore and the thickness of a string also affect pitch in precise numerical ratio: double-stranded strings, for example, will produce pitches an octave higher than quadruple-stranded strings of the same length.[87]

In the final two chapters of his *Manuale harmonices,* Nicomachus seems primarily interested in drawing his work to a close by briefly laying out the names of the notes and tetrachords in the Immutable System and providing some basic definitions of terminology. As he explains it, the system was first expanded by adding a conjunct tetrachord above and below the old heptachord, resulting in a total of thirteen notes spread across four conjunct tetrachords.[88] When the additional note was added to the old heptachord (as he has already described), the mese was no longer truly a "middle" note because there were now fourteen strings; thus, another note was added at the bottom (the proslambanomenos) so that the mese would once again truly be in the middle, with seven strings below and seven above.[89] Moreover, the proslambanomenos also enabled the system to complete a double octave. To this double-octave system, the synemmenon tetrachord was added as a "reminder" (ὑπόμνησις) of the original heptachord. In this way, Nicomachus introduces all five of the traditional tetrachords and the locations of the conjunctions and disjunctions, as well as specifying the names of the notes, with some explanation of their meaning, and the intervals between them. Unlike many of the other theorists, however, he does not refer to these sets of tetrachords as comprising the Greater, Lesser, or Immutable Systems.[90]

---

[87] While the relationship between pitch, on the one hand, and bore and thickness, on the other, is more complex than this, the general principle is commonly applied in the lower octaves of harpsichords, which are sometimes strung with double-stranded strings to avoid the excessive length that would otherwise be necessary. Nicomachus's observation certainly suggests that this principle may have been applied to some of the Greeks' stringed instruments.

[88] Although Nicomachus does not specify the interval spanned by this early scale, it could be represented in the conventional pitching as extending from b to g''.

In the first part of chapter 12, Nicomachus repeats, with some minor variations, the common Aristoxenian definitions of a note, an interval, a scale, consonance and dissonance, and the three basic genera. To these traditional definitions he adds some elaborations of his own. For example, as might be expected from the author of the *Introductio arithmetica*, he proposes an analogy between the note and the mathematical monad, the incomposite and primary element of number: "A note is an indivisible sound, like a monad with respect to hearing."[91] Aristoxenus had remarked in *De principiis* that some of his predecessors erroneously conceived of notes as having breadth, and Nicomachus would seem to be addressing this fallacy in his analogy, as well as by quoting a more common definition, which he attributes to "others" (ἔνιοι): a note is "a sound without breadth, non-intervallic with respect to position."[92] Where intervals are concerned, he strives to clarify the distinction between a ratio and a difference.

---

[89] The relationship of Nicomachus's description to the actual stringing and tuning of the lyre is discussed in chapter 3 (see pp. 244–46 *supra*).

[90] For a tabular display, see p. 374 *supra*. At the end of the chapter, Nicomachus promises his noble patron that his longer work will provide a fuller account of the discoverers of each note and all the details of tetrachordal division in all three genera, as well as a discussion of the Pythagorean *Sectio canonis*. All of this appears in Boethius's *De institutione musica* 1.20–26; and 3–4, once again supporting Bower's argument that the treatise of Boethius preserves this later treatise of Nicomachus (see n. 67 *supra*).

[91] Φθόγγος ἐστὶ φωνὴ ἄτομος, οἷον μονὰς κατ' ἀκοήν (Jan 261.4–5).

[92] ἦχος ἀπλατὴς κατὰ τόπον ἀδιάστατος (Jan 261.6–7). On Aristoxenus's concerns, see p. 303 *supra*. Aristides Quintilianus (*De musica* 1.14) draws a similar analogy between the monad and the protos chronos, with which he further associates the syllable, the note, and a single form or physical gesture.

Using the arithmetic mean as a particular instance, he notes that the difference between the terms is always the same, while the ratio between the terms is always different.[93] Although it might seem that Nicomachus is obliquely criticizing the Aristoxenian emphasis on measuring the "differences" between intervals, in his own definition of the consonance and dissonance of scales, he takes a distinctly Aristoxenian position: consonant scales are those in which the bounding notes, when simultaneously struck, blend as if they were a single sound.[94]

Like Aristoxenus, Nicomachus bases his description of the genera on the intervallic arrangement of the notes within a tetrachord, describing it in the prose terms of tone, semitone, and diesis (which is defined as "half of a semitone") rather than as a sequence of ratios or numerical measurements. Unlike Aristoxenus and Cleonides, however, Nicomachus does not refer to the various shades of the genera; he describes only the diatonic, chromatic, and enharmonic, noting that they are defined by the positions of the movable notes, which are distinct from the stationary notes that bound the tetrachord.[95] Then, after briefly noting that the octave does not truly equal six whole-tones—a common point of contention between the Pythagoreans and the Aristoxenians[96]—Nicomachus lists all the notes of the Immutable System, including the appropriate enharmonic, chromatic, and diatonic suffixes for the movable notes. His list is substantially identical to lists provided by other theorists (as, for example, Cleonides [see p. 374 *supra*]), but Nicomachus actually specifies both the enharmonic and the chromatic/diatonic parhypatai and tritai.[97]

---

[93] For example, in the proportion 12:9:6, where 9 is the arithmetic mean between 12 and 6, the difference between 12 and 9 or 9 and 6 is 3; the ratio 12:9 (i.e., 4:3) is not the same, however, as the ratio 9:6 (i.e., 3:2).

[94] Cf. *Sectio canonis* intro. (see p. 347 *supra*), Cleonides *Harmonica introductio* 5 (p. 375 *supra*), Aristides Quintilianus *De musica* 1.6, and Gaudentius *Harmonica introductio* 8 (p. 502 *infra*)

[95] Nicomachus's description is equivalent to the intervallic arrangement of Cleonides's Harmonia, Whole-tone color, and Intense diatonic (see p. 377 *supra*).

[96] See *Sectio canonis* 14 (pp. 349–50 *supra*) and Nicomachus's own quotation from Philolaus (pp. 401–2 *supra*).

[97] Andrew Barker (*Greek Musical Writings*, 2:268, n. 101) thinks the absence of this specification in other lists indicates that the parhypatai and tritai were

The enumeration of the notes in the Immutable System would hardly seem to be a suitable capstone for a *Manuale harmonices,* but at this point, Nicomachus abruptly concludes his epistolary treatise by begging the noble lady's forgiveness for the inadequacy of his *Manuale* and promising once again a fuller treatment.

> Please forgive the haste of such writing—for you know that you asked me when I was altogether distrait in my journey—and in accord with your most gentle as well as thoughtful manner, accept this as a sort of first-fruit and propitiatory offering. If the gods are willing, expect the fullest and altogether complete treatment of these things to be immediately sent to you by me at the earliest occasion.[98]

Whatever caused both Nicomachus and his noble lady to be uprooted and undertake a period of travel, they must have survived their relocation and eventually exchanged the promised work. Although the loss of that treatment in Greek is lamentable, fortune was kind to Nicomachus in preserving some semblance of his text in the first four books of Boethius's *De institutione musica.*[99]

Manuale harmonicum

Immediately following the *Manuale harmonices* in some of the manuscripts are the fragments on music collected under the title *Manuale harmonicum* and attributed to Nicomachus. These are almost certainly comprised of scholia on his musical theory and some additional passages, probably from the *Introductio musica,* the promised longer work on music. As they stand, they do not form a particularly coherent whole, but they do focus on the general Pythagorean subject of the relationship between musi-

---

not originally movable; Nicomachus's inclusion of both enharmonic and chromatic/diatonic versions of these notes must therefore represent a later development. Against this interpretation, it is important to note that Aristoxenus is quite clear that both the parhypatai and lichanoi moved in the various genera, as can be seen in figure 51 on p. 313.

[98] Τῆς δὲ γραφῆς τοιαύτης τῇ ἐπείξει συγγινώσκουσα—σύνοισθα γὰρ, ὅτι ἐν αὐτῇ τῇ ὁδεύσει μοι ἐπέταξας παντοίως μετεώρῳ—κατὰ τὸν ἡμερώτατόν σου τρόπον καὶ κοινῶν νοημονέστατον ἀπόδεξαι μὲν ὡς ἀπαρχήν τινα καὶ ἐξευμενισμόν, προσδέχου δὲ θεῶν ἐπιτρεπόντων πληρεστάτην καὶ παντοίως ἐντελεστάτην τὴν περὶ αὐτῶν τούτων τεχνολογίαν αὐτίκα μάλα σοι ὑπ' ἐμοῦ πεμφθησομένην μετὰ τῆς πρώτης ἀφορμῆς (Jan 265.1–8).

[99] See pp. 391–93 *supra.*

cal phenomena, number, and higher universal principles. The general contents may be outlined as follows:[100]

Fragment	Subject
1 [= Jan 266.2–17]	The discovery of the lyre by Hermes, and the transmission of the lyric art from Orpheus to Terpander.
2 [= Jan 267.1–271.15]	The numbers with which musicians construct the intervals of the fourth and fifth.
3 [= Jan 271.16–273.24]	The names of the seven strings of the lyre and their association with the seven planets, according to Nicomachus.
4 [= Jan 274.1–275.15]	The expansion of the number of strings from eight to the twenty-eight required to sound all three of the genera. Ptolemy, however, proposed that the number of tonoi is the same as the number of species of the octave, i.e., 7.
5 [= Jan 275.16–277.9]	The twenty-eight strings represent the harmonia of the universe in expanding the sounds of the seven planets.
6 [= Jan 277.10–280.11]	The consonance of the seven sounds and their relationship to the tetraktys and the monad. Pythagoras's further discovery of the relationship between the three hypostases (Existence, Sameness, and Difference), the planetary sounds, and other harmonic numbers. The eighth sphere.
7 [= Jan 280.12–282.18]	The twenty-eight strings with which instrument-builders are concerned, how they are arranged in tetrachords, and the relationship between the tetrachords and the harmonia of the universe.

Fragment 1, which has already been discussed in chapter 3, recalls the traditional association of the lyre with Hermes, who taught Orpheus how to play the lyre, and from him, the ancient art subsequently passed to Thamyris, Linus, Heracles, Amphion, and eventually Terpander. Terpander, in his turn, took the lyre to

---

[100] In his edition of the fragments, Jan (*Musici scriptores graeci,* 266–82) arranges the material in ten "chapters," but this seems to take little account of the structure of the manuscripts or the content and style of the fragments. Charles-Emile Ruelle, who provides the only modern-language translation of the text (*Nicomaque de Gérase. Manuel d'harmonique et autres textes relatifs à la musique traduits en français pour la première fois,* avec commentaire perpétuel par Charles-Emile Ruelle, Collection des auteurs grecs relatifs à la musique, no. 2 [Paris: Baur, 1881]), arranges the material into seven fragments, and his arrangement has been adopted here. For another discussion of these fragments, see Barbera, "Pythagorean Mathematics," 173–78.

Egypt, where he eventually gained the reputation as its inventor. Some authorities, according to the fragment, continue to associate the lyre with Cadmus, the son of Agenor.[101]

In the second fragment, a series of numbers is proposed to describe the ratios of the fourth and fifth—and the smaller intervals they comprise. The intervening numbers in each instance are obtained by ascending (ἐπιτείνειν) from smaller to larger numbers or descending (ἀνιέναι) from larger to smaller numbers in each proportion. The notes (with their conventional pitching shown in brackets) and ratios are set forth as follows:

Fourth from parhypate hypaton to parhypate meson [c', d', e', f']	192:216:243:256
Fourth from proslambanomenos to lichanos hypaton [a, b, c', d']	216:243:256:288
Fifth from parhypate meson to trite diezeugmenon [f', g', a', b', c'']	512:576:648:729:768
Fifth from lichanos hypaton to mese [d', e', f', g', a']	864:972:1024:1152:1296

The differences between the numbers are subsequently applied to demonstrate that the leimma—256:243—is smaller than a true half-tone.

It is noteworthy that the numbers for the fourth, though not the note names, preserved in fragment 2 also appear in proportion in Boethius's *De institutione musica* 1.17–18 (cf. 2.28 and 2.31). Likewise, chapter 20 of the first book of *De institutione musica*, entitled "Concerning the additions of strings and their names" (De additionibus chordarum earumque nominibus), begins with a specific reference to Nicomachus and carries the story of the development of the lyre beyond the point where the first fragment breaks off. If Boethius followed the exact design of Nicomachus's longer work in the composition of his own treatise,[102] these two fragments must have originally formed adjacent sections of the first book of Nicomachus's *Introductio musica*.

Fragments 3–7, which in nine manuscripts are separated from the previous two, provide characteristic neo-Pythagorean or neo-Platonic elaborations on the significance of strings of the lyre and other technical aspects of music theory. Some part of these fragments may come directly from Nicomachus's *Introductio musica*, but they convey much more the character of scholia. Fragment 3, for example, which paraphrases the association of the seven strings with the seven planets as found in the *Manuale harmonices* 3 (see figure 57 *supra*), citing Nicomachus by name, comments particularly on the odd association of the paraneate with Aphrodite rather than with Hermes, adding that this is "irregular, if there is no mistake in the text."[103] The scholiast then proceeds to suggest an alternative to Nicomachus's account: it is the Moon that should be associated with the hypate, Kronos with the neate.[104] Boethius, too, touches on the conflicting views in *De institutione musica* 1.27.

---

[101] See p. 235 *supra*.

[102] As Bower, "Boethius and Nicomachus," hypothesizes.

The fourth fragment may very well have been a scholion to the section of Nicomachus's *Introductio musica* represented by fragment 2 and perhaps Boethius's *De institutione musica* 1.20. The story of Theophrastus of Pieria, Histiaeus of Colophon, and Timotheus of Miletus adding strings to the lyre is dismissed as simply an amusing tale, and the scholiast recalls that the *Cheiron* of Pherecrates—which he perhaps knew from the fragment preserved in the Plutarchean *De musica*—pillories these musical innovators. Nevertheless, as the musical system expanded, the number of strings was gradually increased, eventually extending to fifteen to incorporate in a double octave all the notes of a single genus without the synemmenon tetrachord, eighteen to incorporate all the notes of a single genus with the synemmenon, or twenty-eight to incorporate all the notes in all the genera in the Immutable System. The scholiast adds that Ptolemy, for his part, favored the double octave as encompassing the seven possible octave species and, by extension, the seven tonoi. The reference is unspecified by the scholiast, but it certainly accords with Ptolemy's *Harmonica* 2.4 and 9.

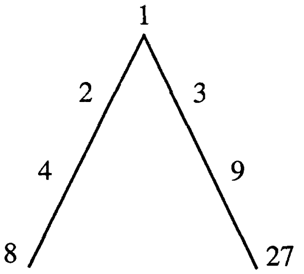
The final three fragments, which may very well form a single extended fragment, are quite typical of neo-Pythagoreanism and neo-Platonism in their exploration of various numerical patterns and the ways in which they relate to musical and natural phenomena. They certainly could represent additional sections of Nicomachus's *Introductio musica,* although nothing of this sort is included in Boethius's *De institutione musica.* If they are scholia, on the other hand, it is not clear to which section of the *Manuale harmonices* or *Introductio musica* they might apply. Though they leave unspecified the particular sources on which they draw, these can be easily surmised.

---

[103] ἀτάκτως, εἰ μὴ γραφικὸν εἴη τὸ πταῖσμα (Jan 272.4–5).

[104] Levin, "Nicomachus. Manual of Harmonics," 93–103 (cf. *Manual of Harmonics*, 47–57), provides a detailed investigation of the various ancient conceptions of the relationship between the planets and the strings of the lyre. See also pp. 428–29 *infra*.

The twenty-eight strings of the lyre are likened to the seven numbers of the famous duple and triple multiples used by the demiurge in the psychogony of Plato's *Timaeus*:



If 1, the principle of all things, is added to 27, the number of strings, 28, results. These twenty-eight notes are arranged in five tetrachords, which represent beginning, middle, end, a conjunctive cooperation, and a disjunctive cooperation.[105] Returning to the number 7, the author notes that each of the seven planets produces a sound, corresponding to one of the seven vowels (α, ε, η, ι, ο, υ, ω), which are like the mathematical monad and the point in geometry. When the elements are combined with matter—for example, the soul with the body or harmonia with strings—living things, tonoi, mele, active functions, and divine perfections result. Moreover, these planetary sounds can be symbolically evoked by sounding the vowels.[106] The number 7 itself reveals affinities with the numbers 4, 3, and 1, additional numbers drawn from the psychogony of Plato's *Timaeus*, and the squares of the two sides of the Platonic "lambda" (i.e., $2^2 \times 3^2$) produce the number 36, a number of considerable astrological and musical significance.[107] The number 4 leads the scholiast to comment on the quaternery of 6:8:9:12, the famous Pythagorean "harmonia," which Nicomachus described in the *Manuale harmonices* as the "ruling proportion."[108] This series, which is the root of the tetrachords because it embodies two fourths (6:8 and 9:12), equals the number 36 when it is combined, once again, with the primal 1 (i.e., $6 + 8 + 9 + 12 + 1 = 36$). Finally, the number 36 is associated with the eighth sphere, the fixed sphere of the zodiac, the sound of which remains always the same and therefore does not enter into the universal harmony.

---

[105] A similar analogy appears in Aristides Quintilianus *De musica* 3.14 (see pp. 565–67 *infra*).

[106] The author of the fragment refers specifically to his writing "on the number 7" (περὶ ἑβδομάδος), and indeed many of the same parallels drawn in these fragments appear in the section of the θεολογούμενα τῆς ἀριθμητικῆς devoted to the heptad (Waterfield, *Theology of Arithmetic,* 87–100). On the sounding of the vowels, see Charles-Emile Ruelle, *Le chant gnostico-magique des sept voyelles grecques,* Mémoires lus au congrès international de l'histoire comparée, 8e section, histoire musicale, Paris, 1900 (Solesmes: Saint-Pierre, 1901) and Diane Touliatos, "Nonsense Syllables in the Music of the Ancient Greek and Byzantine Traditions," *Journal of Musicology* 7 (1989): 231–43.

Both the *Manuale harmonices* and the *Manuale harmonicum* were used by later Byzantine musicographers such as George Pachymeres and Manuel Bryennius, who relied on the authority of Nicomachus in their descriptions of the planetary scales, the role of Pythagoras in the expansion of the lyre from seven to eight strings, and other Pythagorean lore. This was no accident or coincidence: later writers—and especially Byzantine scholars—were captivated by the notion that music theory, as represented by neo-Pythagorean and neo-Platonic writers, could reveal higher universal and Christian truths. The treatises of Nicomachus marked out a new path for later music theorists writing in Greek and, for that matter, in Latin—a path that leads first to such complex musico-philosophical works as Aristides Quintilianus's *De musica*, Boethius's *De institutione musica*, and Martianus Capella's *De nuptiis Philologiae et Mercurii*, and eventually to the neo-Platonic revivals of the Renaissance.[109]

---

[107] See, for example, Aristides Quintilianus *De musica* 3.12 and 23 (see pp. 564–65 and 572–74 *infra*).

[108] See p. 400 *supra*.

[109] For a useful discussion of the influence of neo-Platonism in Renaissance music (albeit without much reference to the treatises of Nicomachus), see Gary Tomlinson, *Music in Renaissance Magic: Toward a Historiography of Others* (Chicago: University of Chicago Press, 1993); and Ann E. Moyer, *Musica scientia: Musical Scholarship in the Italian Renaissance* (Ithaca, N.Y.: Cornell University Press, 1992).

Theon of Smyrna

Nicomachus's *Manuale harmonices* is merely a single representation of the second-century expansion of interest in Plato and Pythagoreanism that eventually led to the formal neo-Platonism of Plotinus (205–269/70 C.E.). Plutarch's *Platonicae quaestiones* and *De animae procreatione in Timaeo,* for example, attempt to illuminate difficult Platonic passages, and especially the complex psychogony in the *Timaeus,* while Albinus and Apuleius of Madaura, who have sometimes been thought to represent a second "school" of Platonism outside Athens,[110] provided general guides to Platonism.

Smyrna, located at the head of a protected gulf on the western coast of Asia Minor (see map 1 on p. 20), was a wealthy trading center, much favored during the second century by the Roman emperors. Albinus taught there in mid-century, and Theon must have been active in the decades prior to this time. In his one surviving work, *Expositio rerum mathematicarum ad legendum Platonem utilium,* he quotes the same Thrasyllus to whom Nicomachus referred, as well as Archytas, Hippasus, Philolaus, Plato, Aristotle, Adrastus of Aphrodisias, and others.

As represented in modern editions, Theon's *Expositio* consists of an introduction and three major sections: on arithmetic (περὶ ἀριθμητικῆς), on music (περὶ μουσικῆς), and on astronomy (περὶ ἀστρονομίας). In his introduction, Theon states that he will provide a summary of the "tradition of mathematical theorems—arithmetic, music, and geometry (and this with respect to both stereometry and astronomy)—without which, as he [Plato] said, the good life is impossible."[111] At the beginning of the section on arithmetic, he restates the order as arithmetic, music, plane geometry, stereometry, and astronomy, adding that in the natural order of things, music ought to come at the end because it deals with the harmonia of the universe (ἡ τοῦ κόσμου ἁρμονία). This later restatement might suggest that the surviving *Expositio* is incomplete because there are no discrete sections on plane or solid geometry, but perhaps the three large sections identified at the beginning of the introduction are intended to encompass the five categories stated at the beginning of the section on arithmetic. In fact, the section on arithmetic does include consideration of various planar and polygonal numbers, while the section on astronomy includes some consideration of abstract spherical motion.[112]

---

[110] An excellent survey of these writers is provided in Dillon, *Middle Platonists,* 266–340 (Dillon, however, rejects the idea that Albinus and Apuleius represent a definite and distinct sect of Platonism).

[111] μαθηματικῶν θεωρημάτων παράδοσιν, ἀριθμητικῶν τε καὶ μουσικῶν καὶ γεωμετρικῶν τῶν τε κατὰ στερεομετρίαν καὶ ἀστρονομίαν, ὧν χωρὶς οὐχ οἷόν τε εἶναί φησι τυχεῖν τοῦ ἀρίστου βίου (Hiller 1.15–2.1).

The history of the text for the *Expositio* certainly does not resolve the question of its completeness. Sixty texts contained in fifty-eight codices preserve all or some part of the introduction and first two major sections of the *Expositio,* but no single manuscript contains all three sections. The earliest of these manuscripts is Venetus Marcianus gr. 307, a codex dating from the late eleventh or early twelfth century and once part of the famous library of Cardinal Bessarion. The entire codex is devoted to Theon's *Expositio,* but it terminates at the end of the musical section.[113] Venetus Marcianus gr. 303, a later codex dating from the fourteenth or fifteenth century, preserves the section on astronomy. This section of the *Expositio* must have become separated from the rest of the treatise at an early date, and it is possible—though by no means certain—that other portions were separated and eventually lost. In any case, as the manuscripts attest, the treatise came to be widely known in a form including at most the introduction and the first two sections.[114]

As it happens, parts of the musical section of Theon's treatise were also separately transmitted from an early date, sometimes without any attribution to Theon. In Heidelbergensis Palatinus gr. 281, completed in 1040 C.E., a few folios (ff. 174r–179v) are devoted to a "Division of a Musical Canon" (Μουσικοῦ κανόνος κατατομή); this is comprised of three separate excerpts from the *Expo-*

---

[112] Heath (*Greek Mathematics,* 2:239–40) makes this same general observation. For a comprehensive list of editions and translations of the *Expositio,* see the Bibliography under "Theon of Smyrna." Througout this section, references will be to the text of Hiller (see chapter 1, n. 19 *supra*).

[113] For a full description of this manuscript, see Mathiesen, *RISM BXI,* **261**.

[114] For no readily apparent reason, the treatise appears twice in this form in one codex: Parisinus gr. 1817 (*RISM BXI,* **69**). In another codex, Venetus Marcianus gr. app. cl. XI/30f (coll. 976.3) (*RISM BXI,* **274**), the treatise breaks off just prior to the end of the musical section, no doubt due to the loss of a few folios at this point.

sitio. Six other manuscripts preserve this same excerpt, and none attributes it to Theon.[115] A somewhat later codex dating from the thirteenth century, Venetus Marcianus gr. 512 (coll. 678), includes a "Summary and Synopsis of the Whole of Music" (συγκεφαλαίωσις καὶ σύνοψις τῆς ὅλης μουσικῆς) attributed to Theon the Platonist, which consists of only the first few parts of the musical section of the *Expositio*. Nine other manuscripts preserve this excerpt, but unlike Venetus Marcianus gr. 512, all of them follow it with the "Pappus" version of the treatise of Cleonides.[116]

These truncations underscore the fact that the *Expositio* is largely a pastiche of material, including lengthy quotations from earlier authors. Nevertheless, a certain relationship among the sections is established by the introduction, which conveys the impression that the *Expositio* was intended as an elementary introduction to the Pythagorean elements in Platonic philosophy—or, to the developing tradition of neo-Platonism. After stressing the overarching importance of mathematics, Theon observes that "only the philosopher is a musician" (μόνος μουσικὸς ὁ φιλόσοφος) because only the philosopher will recognize the beautiful form, rhythm, and harmonia that reflect the real beauties of the Ideas. The final purpose of music is to unite and harmonize, just as god is the harmonizer of dissonance through music and medicine. Moreover, the five mathematical sciences—arithmetic, geometry, stereometry, music, and astronomy—can be likened to Empedocles's five fountains of purification and the five stages of initiation into the revelation of the authentic mysteries, the fifth stage of which allows for a "likeness unto god, insofar as possible."[117] With this elevated view, Theon concludes that he could commend the use and necessity of the disciplines at greater length, "but so as not to seem to be vulgarly wasting time,"[118] he will begin his explanation of the theorems necessary for understanding Plato's writings.

---

[115] Heidelbergensis Palatinus gr. 281 is described in Mathiesen, *RISM BXI*, **14**; the six other manuscripts are **17**, **52**, **114**, **172**, **215**, and **250**.

[116] Venetus Marcianus gr. 512 is described in Mathiesen, *RISM BXI*, **266**; the other manuscripts are **41**, **89**, **176**, **201**, **219**, **234**, **238**, **253**, and **255** (this codex actually contains two versions of the treatise: the summary version and at the end of the codex the full version of the introduction and the sections on arithmetic and music). A tenth codex, Bononiensis gr. 2432 (15th century; *RISM BXI*, **158**) should probably be added to this group, even though it is missing the first part of the excerpt because a number of folios have been lost near the beginning of the codex. On the "Pappus" version of Cleonides's treatise, see pp. 367–68 *supra*. In addition to these somewhat logical excerpts, a few random fragments appear in Oxoniensis Bodleianus Savilianus gr. 5 (*RISM BXI*, **145**).

[117] ὁμοίωσις θεῷ κατὰ τὸ δυνατόν (Hiller 16.1–2).

Following the introduction, the section on arithmetic begins with the brief observation that arithmetic theorems must form the first subject of discussion because they are necessary in order to understand the musical theorems. These, however, will not be the theorems of practical music-making; rather, "we desire to understand the harmonia in the cosmos and the music in the cosmos."[119] The balance of the first section then discusses the principles of Pythagorean arithmetic, more or less paralleling the topics in Nicomachus's *Introductio arithmetica*: the classification of numbers, even and odd numbers and their subdivisions, prime numbers, composite numbers, plane numbers (i.e., square, oblong, triangular, and polygonal numbers, their gnomons, and their relationship to arithmetic progressions), circular and spherical numbers, three-factor solid numbers, pyramidal numbers, and perfect, abundant, and deficient numbers. Theon also includes a discussion of the side- and diameter-numbers (πλευρικοὶ καὶ διαμετρικοὶ ἀριθμοί) of the Pythagoreans.[120]

Theon, on the authority of Plato, dismisses the testimony of the senses in the section on arithmetic, but in beginning the section on music, he allows that the harmonia in the cosmos has a sensible counterpart. In this section, he will accordingly consider both types: the sensible, in terms of the traditional subjects of ancient Greek music theory; and the intelligible, in terms of number. In a number of the manuscripts preserving the *Expositio*, marginal *custodes* mark out the subjects of the treatise, and those in the musical section provide a useful outline of Theon's treatment:

---

[118] τοῦ δὲ μη δοκεῖν ἀπειροκάλως διατρίβειν (Hiller 16.5).

[119] ὀρεγόμεθα δὲ τὴν ἐν κόσμῳ ἁρμονίαν καὶ τὴν ἐν τούτῳ μουσικὴν κατανοῆσαι (Hiller 17.2–3).

[120] For a very detailed treatment of this material, see Barbera, "Pythagorean Mathematics," 1–60; for a more condensed survey, see Heath, *Greek Mathematics*, 1:65–117 (especially 91–93, 97–113).

Theon of Smyrna, *Expositio rerum mathematicarum ad legendum Platonem utilium* (only *De musica*)

[Braces ({ }) indicate that the title is not present as a *custos*.]

1. Introduction. [Hiller 46.20]
2. What is a note and enharmonic sound? [Hiller 47.18]
3. What is an interval? [Hiller 48.8]
4. What is harmonia? And, on the difference of notes. [Hiller 48.12]
5. On intervals. [Hiller 48.16]
6. On harmonia and consonance. [Hiller 49.6]
7. On the tone. [Hiller 53.1]
8. On the semitone. [Hiller 53.8]
9. What is diatonic melos? [Hiller 53.17]
10. What is chromatic melos? [Hiller 54.16]
11. What is enharmonic melos? [Hiller 55.8]
12. What is a diesis? [Hiller 55.11]
13. What is a note? [Hiller 60.13]
14. What is a tone? [Hiller 66.14]
15. What is a leimma? [Hiller 67.13]
16. That the tone is not divided in two. [Hiller 70.14]
17. What is a term? [Hiller 72.21]
18. In how many senses is "logos" used? [Hiller 72.24]
19. What is a ratio of proportion? [Hiller 73.16]
20. What is a term? [Hiller 74.8]
21. On proportion. [Hiller 74.12]
22. On equality. [Hiller 74.15]
23. What is a multiple ratio? [Hiller 76.8]
24. What is a superparticular ratio? [Hiller 76.21]
25. On the superpartient ratio. [Hiller 78.6]
26. On the multiple superparticular. [Hiller 78.23]
27. On the multiple superpartient. [Hiller 79.15]
28. What is the ratio of number to number? [Hiller 80.7]
29. On prime ratios. [Hiller 80.15]
30. In what way do interval and ratio differ? [Hiller 81.6]
31. On proportion and equality. [Hiller 82.6]
32. Proportion and mean differ. [Hiller 84.15]
33. On proportions. [Hiller 85.8]
34. On the leimma, which is in the ratio 256:243. [Hiller 86.15]
35. {On the division of the canon.} [Hiller 87.4]
36. On close-packing [Hiller 90.22]
37. On the tetraktys and the decad. [Hiller 93.17]
38. How many tetraktues are there? [Hiller 93.25]
39. On the decad. [Hiller 99.17]
40. On the monad. [Hiller 99.24]
41. On the dyad. [Hiller 100.8]
42. On the triad. [Hiller 100.13]
43. On the tetrad. [Hiller 101.11]
44. On the pentad. [Hiller 101.14]
45. On the hexad. [Hiller 102.4]
46. On the heptad. [Hiller 103.1]
47. {On the octad.} [Hiller 104.20]
48. {On the ennead.} [Hiller 106.3]
49. {On the decad.} [Hiller 106.7]
50. {On the ratio of proportions and means.} [Hiller 106.12]
51. On equality, that it is the beginning of proportions and how multiplication arises. [Hiller 107.10]
52. That proportions are resolved to equality. [Hiller 110.19]
53. On forms. [Hiller 111.14]

54. On solids. [Hiller 112.26]
55. What is the arithmetic mean? [Hiller 113.18]
56. [What is] the geometric mean? [Hiller 114.1]
57. What is the harmonic mean? [Hiller 114.14]
58. What is the subcontrary of the harmonic mean? [Hiller 115.5]
59. What is the fifth mean? [Hiller 115.12]
60. What is the sixth mean? [Hiller 115.20]
61. How are the means discovered? [Hiller 116.8]

Theon discusses the "sensible" (αἰσθητή) counterpart of the harmonia of the cosmos in the first sixteen subjects, where he reviews basic definitions of musical elements, drawing on various authorities who are sometimes identified by name. In subject 2, for example, he explains Thrasyllus's distinction between "enharmonic sound" and all the other types of sounds that exist in the world: enharmonic sound is a distinct sound that can be related to other higher and lower sounds, while the sound of thunder is merely noise. In subject 5, he enlarges the traditional definition of consonance by distinguishing between consonances that are "antiphonic" (ἀντίφωνον)—the octave and double octave—and those that are "paraphonic" (παράφωνον)—the fifth and the fourth.[121]

According to Theon's paraphrase of Adrastus's treatise on harmonia and consonance (subject 6), sound itself is based on the percussion of air, and higher and lower pitches are caused by the relative frequency of percussion. Related together, these sounds produce intervals, which are consonant (including the antiphonic and paraphonic intervals) or dissonant. Adrastus also accepts as consonant any of the three primary consonant intervals combined with one or more octaves. By accepting the compound interval of an octave-and-a-fourth (8:3), he would seem to violate the common Pythagorean principle that only multiple and superparticular ratios can be consonant, and especially those contained within the numerical quaternary 1, 2, 3, 4. Nevertheless, the interval is certainly implied in the psychogony of Plato's *Timaeus*, and both Theon (paraphrasing Adrastus) and Gaudentius, commonly viewed as falling within the Pythagorean tradition, clearly accept the interval among the consonances.[122] In practical terms, consonance is limited by "position of the voice," which Adrastus defines as the region within which sound can travel from high to low and back again; this register is greater in some and lesser in others.[123] Within these registers, sounds cannot be combined in any haphazard way in music but only in accord with certain defined manners.

---

[121] Gaudentius and Bacchius also refer to paraphonic intervals, but their definitions are quite different. For Gaudentius, paraphonic intervals are "between consonant and dissonant," while for Bacchius, they are intervals in which either the lower or the higher pitch is equally suited to the melos (it is possible, however, that the text of Bacchius's treatise is corrupt at this point). See pp. 502 and 587 *infra*.

Within the context of "position of the voice," Theon provides (subjects 7–8) the common definition of the tone as the difference between the fifth and the fourth, adding the standard disclaimer that the semitone is an incomplete tone, not a true half-tone. The measure of tones and semitones is then used (in subjects 9–11) to describe in prose terms the three basic genera of melos; ratios and numerical measurements are not used at this point. Like Nicomachus, Theon does not refer to the various shades, but he does make it clear that the genera are defined by the positions of the movable notes, which are distinct from the stationary notes that bound the tetrachord.

Diatonic	Semitone		Tone		Tone
Chromatic	Semitone		Semitone	Trihemitone	
Enharmonic	Diesis	Diesis	Ditone		

Figure 60.

Under the broad rubric of subject 12 ("What is a diesis?") and perhaps still paraphrasing Adrastus, Theon credits Pythagoras with the discovery of the numerical relationships among sounds, including the ratio of the octave-and-a-fourth, 8:3. Pythagoras's experiments with the tension, length, and density of strings, suspended weights, the size and intensity of wind columns, the resonance of disks, and vases filled with different levels of water—all these are briefly recalled, but the stories themselves are not repeated.[124] Theon is interested in the Pythagorean mathematics, not in the legends surrounding Pythagoras himself. Even so, his description of the Pythagorean ratios is cursory, emphasizing the basic tetraktys of 1:2:3:4 rather than the harmonia of 12:9:8:6 described by the Plutarchean Soterichus and Nicomachus. The basic tetraktys does not include the important intervals of the tone (9:8) and the diesis (256:243), but at this point, Theon simply notes these ratios. In subjects 13–16, he will show how the ratios of the basic tetraktys are added and subtracted to produce larger and smaller intervals.

---

[122] Little is known of Adrastus of Aphrodisias, who flourished at the end of the first century C.E. On Plato's psychogony, see pp. 362 (and n. 16) and 409–11 *supra*. For a fuller discussion of the matter, see Barbera, "Consonant Eleventh," *passim*.

[123] This definition is very similar to the one provided by Nicomachus in the *Manuale harmonices* (see pp. 395–96 *supra*).

[124] Theon mentions both Lasus of Hermione and Hippasus of Metapontum as figures who explored the acoustic qualities of vases filled with different levels of liquid. On Lasus, pp. 75–77, 271, and 303 *supra*.

In subject 13 ("What is a note?"), Theon begins with the familiar Aristoxenian definition of the note: "a falling of the voice on one pitch is a note."[125] This definition leads to the observation already encountered in the introduction to the *Sectio canonis* and the *Manuale harmonices* of Nicomachus that as the pitch of notes is based on the relative velocity of pulsation, the relationships between notes can be compared in terms of number. Theon credits this principle to Eudoxus and Archytas but observes that Adrastus expanded on it by recognizing that the senses could judge the size of the intervals, while the ratios confirmed their judgment. Theon then accordingly provides the ratios for the fourth (4:3), fifth (3:2), octave (2:1), octave-and-a-fourth (8:3), octave-and-a-fifth (3:1), and double octave (4:1), as well as the ratio for the whole-tone (9:8), the difference between the fifth and the fourth.

The twin cubes of the psychogony in Plato's *Timaeus* would, of course, actually extend the scale to four octaves and a sixth (i.e., 27:1). Aristoxenus, Theon explains, limited the extension of the scale to two octaves and a fifth for practical reasons, but Plato was trying to express the full harmonia of the solid body of the universe. Theon is also anxious to reconcile the apparent disagreement between writers who associate larger numbers with lower pitches and those who draw the opposite association. He is aware of the ostensible conflict between the measurements of pitch by frequency and by string- or wind-column length, but he explains it by suggesting that lower pitches have an intrinsically greater force; thus, the lowest sounds are properly associated with the largest numbers. Recognizing that he seems to be drifting from his subject, Theon returns to the basic Pythagorean tetraktys, remarking that Plato gave priority to the interval of the fourth. The fifth, although a primary consonance, is defined in terms of the fourth: it is separated from the fourth by a tone, precisely the definition given by Aristoxenus.[126]

---

[125] φθόγγον δὲ εἶναι φωνῆς πτῶσιν ἐπὶ μίαν τάσιν (Hiller 60.13). For Aristoxenus's definition, see p. 306 *supra*. The definition is repeated by Cleonides (p. 372) and Gaudentius (p. 501 *infra*).

In the next several subjects (14–16), Theon reviews the numerical calculations necessary to produce the smallest consecutive integers that will demonstrate the ratios comprising the fourth, the same numbers described in the second fragment of the *Manuale harmonicum* attributed to Nicomachus and in Plutarch's *De animae procreatione in Timaeo* (1020c–e):[127]

192:216:243:256 (i.e., 8:9 + 8:9 + 243:256)

Theon adds that some prefer to double the numbers so that the series can be extended to a full octave:

384:432:486:512

As expressed by these larger numbers, the ratio of the diesis, or the leimma, no longer exhibits a difference of 13 between its two terms. Theon (or Adrastus?) states that Plato defined the number 13 as the leimma, adding immediately that Plato did not mean to define the difference but rather the ratio between the terms as the leimma. The ratio of course is the same no matter how many times the terms are doubled. This confusion about the leimma, as well as the large numbers, suggests that Theon may very well be trying to reconcile the tradition of Pythagorean commentaries, such as Plutarch's *De animae procreatione in Timaeo* and the *Timaeus* itself. In *De animae procreatione in Timaeo* (1017f and 1022a), the same large numbers appear and the leimma is indeed defined as the number 13; in the *Timaeus*, on the other hand, Plato does not define (see 36b) the leimma as the number 13 but rather as the ratio 256:243.

In any event, Theon proceeds to demonstrate in terms of Pythagorean mathematics that the tone cannot be divided into two equal semitones—a point already demonstrated in the *Sectio canonis* as an implicit refutation of Aristoxenus's geometric division of musical space.[128] He recognizes, however, that the geometric conception of dividing a tone in half has a certain allure and might even be possible in ideal terms. Nevertheless, in his view, the conception is false in practical terms because when any object is divided, a small part of it is lost: a bridge, no matter how thin, will occupy some small portion of a string; when a shaft is cut into parts, some of the material is lost. Likewise, any action repeated will produce slightly different results: two identical punctures cannot be made; a string cannot be plucked twice with exactly the same force; a finger cannot be dipped into ink twice to exactly the same degree.

---

[126] *Elementa harmonica I* (III/B/b) (da Rios 57.1–2).

[127] See p. 408 *supra*. Plutarch attributes the identification of these large numbers to Crantor (ca. 335–ca. 275 B.C.E.) and Eudorus (fl. ca. 25 B.C.E.), both of whom wrote commentaries on the *Timaeus*.

[128] See pp. 312–13, 327–29, 349–51, and 405 *supra*. For a thorough discussion of the mathematics, see Barbera, "Pythagorean Mathematics," 185–87.

With the exception of subjects 35–36 ("On the division of the canon" and "On close-packing"), the balance of Theon's section on music is devoted to the "intelligible" (νοητή) harmonia of the cosmos, which is revealed through numbers. He begins (subjects 17–18) with two definitions: term (ὅρος) and logos (λόγος). A term is a particular with respect to number, magnitude, function, mass, and so on. Logos, on the other hand, has many meanings, including language, reasoning, calculation, speech, and the like. Theon, however, is primarily concerned with Plato's sense of the term:

> According to Plato, "logos" is used in four ways: mental thought without sound; the flow of the voice coming from mental thought; the explanation of the elements of the whole universe; and the ratio of proportion. It is concerning this ratio of proportion we now propose to speak.[129]

Subjects 19–29 form a sort of Pythagorean primer touching on the distinctions between ratio and proportion (19–21); equal, multiple, superparticular, superpartient, and multiple superparticular or superpartient ratios (22–27); ratios such as that of the leimma (256:243), in which the numbers have none of the relationships outlined in the previous subjects (28); and prime ratios, those expressed in the smallest possible integers (29).[130]

Subjects 30–33 are somewhat more advanced. Theon first explains (30) that interval and ratio are distinct. The ratios 1:2 and 2:1, for example, are different, but both contain the same interval. All ratios are based on a fundamental measure of equality, and proportions, which can be either continuous (e.g., 1:2:4) or discontinuous (e.g., 6:3::4:2), are composed of ratios. Theon also observes (32–33) that proportions are distinct from means: any number falling between two extremes is a mean, but only certain numbers are proportional means. There are three of these: the arithmetic, the geometric, and the harmonic.[131] A fuller discussion of the proportional means, however, is deferred until Theon returns to the subject at the end of the musical section. Subject 34 ("On the leimma, which is in the ratio 256:243") simply recalls the material of subjects 14–16.[132]

---

[129] κατὰ δὲ Πλάτωνα τετραχῶς λέγεται λόγος, ἥ τε διάνοια ἄνευ φθόγγου καὶ τὸ μετὰ φωνῆς ῥεῦμα ἀπὸ διανοίας καὶ ἡ τῶν τοῦ ὅλου στοιχείων ἀπόδοσις καὶ ὁ τῆς ἀναλογίας. νῦν δὲ πρόκειται περὶ τοῦ τῆς ἀναλογίας λόγου ζητεῖν (Hiller 73.11–15).

[130] On these ratios, see chapter 4, nn. 119 and 121 *supra*.

Having defined the various ratios, Theon seems to return temporarily to the "sensible" counterpart of the "intelligible" harmonia by presenting Thrasyllus's division of a monochord (subjects 35–36). While it might be thought this division would be similar to that of the *Sectio canonis,* it is in fact rather different. Thrasyllus is concerned with showing a close relationship between the tetraktys of the decad—1, 2, 3, 4—and the process of the division. He therefore follows this pattern by dividing the string in half, then in thirds, and then in fourths; the *Sectio canonis,* by contrast, begins by marking the string into fourths. In Thrasyllus's canon, each subsequent division can subsume all the previous divisions because it contains a greater number of parts. Thus, three equal parts A, B, and C can show the ratios of 3:1 (ABC:C) and 3:2 (ABC:BC), as well as the ratio of 2:1 (AB:B or BC:C). Four equal parts A, B, C, and D can show all the previous ratios, as well as 4:3 (ABCD:BCD) and 4:1 (ABCD:D). After describing in prose the ratios of the various notes one to another, he assigns a number to each note to facilitate visualization of their sequence and numerical relationship:

---

[131] The arithmetic mean, it will be recalled, exceeds the lesser extreme by the same number as the greater extreme exceeds the mean (e.g., 12:9:6; 9 exceeds 6 by 3, and 12 exceeds 9 by 3). The geometric mean is in the same ratio to the lesser extreme as the greater extreme is to the mean (e.g., 1:3:9). The harmonic mean exceeds and is exceeded by the same portion of the extremes (e.g., 12:8:6; 8 exceeds 6 by a third of 6 [2] and 12 exceeds 8 by a third of 12 [4]). The harmonic mean is also sometimes described as the mean producing excesses in the same ratio as the extremes (e.g., 12:6 = 2:1; 12 - 8 = 4 and 8 - 6 = 2; 4:2 = 2:1). See pp. 362–63 and 399–401 *supra* and (for formulas) 427 *infra.*

[132] Cf. Hiller 67.21–68.12 and 86.15–87.3.

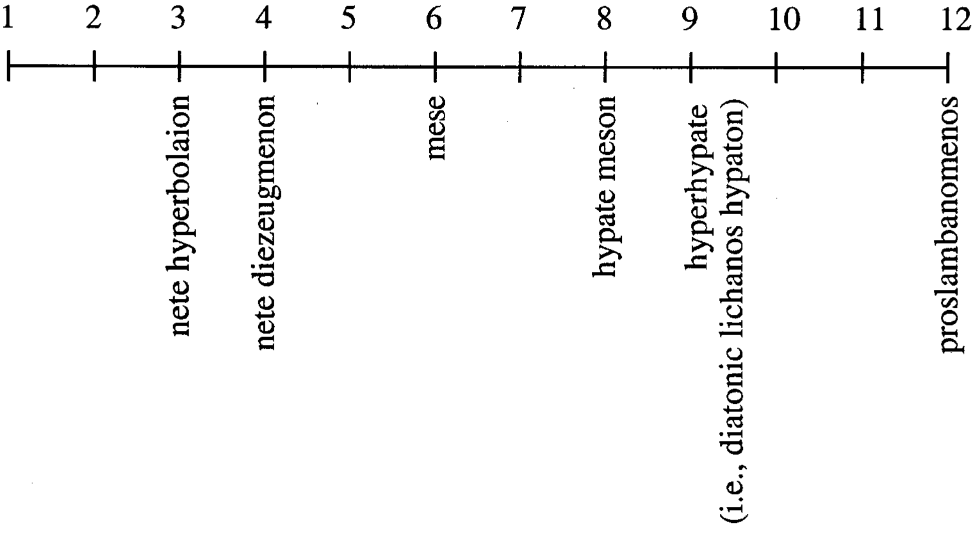


Figure 61.

Like the *Sectio canonis,* Thrasyllus employs only the consonant intervals of the fourth, fifth, and octave in the first part of his division, but unlike the *Sectio canonis,* he fails to locate three of the fixed notes: the hypate hypaton, the paramese, and the nete synemmenon. These, together with the various movable notes, are located in subject 36 ("On close-packing") by filling in the intervals with sesquioctaval whole-tones. By including both the diatonic and chromatic positions, with the sole exception of the chromatic lichanos hypaton, Thrasyllus's division does indeed show the close-packing criticized by Aristoxenus. The *Sectio canonis,* by contrast, includes only the diatonic positions (overlooking the trite synemmenon) in its division. Thrasyllus even suggests that an enharmonic division can be created by omitting the diatonic movable notes. But as this would leave the chromatic movable notes in place, Thrasyllus probably meant that both positions of the upper movable notes should be removed, thereby leaving only two intervals between the stationary notes: an incomposite ditone as the upper interval and a diesis as the lower interval.[133]

Once again, Thrasyllus turns to number as a way of facilitating visualization of the relationship of all these notes, but he provides only the initial number that is to be assigned to the nete hyperbolaion: 10,368. The successive numbers, he says, can easily be computed by anyone who has followed the ratios already described, and in fact, 10,368 is the smallest common denominator that will accommodate all the ratios (expressed as integers) over the two octaves from nete hyperbolaion to proslambanomenos.[134]

---

[133] This is precisely the type of early enharmonic pattern described by the Plutarchean Lysias. See pp. 358–59 *supra.*

nete hyperbolaion	10,368
diatonic paranete hyperbolaion	11,664
chromatic paranete hyperbolaion	12,288
trite hyperbolaion	13,122
nete diezeugmenon	13,824
diatonic paranete diezeugmenon (= nete synemmenon)	15,552
chromatic paranete diezeugmenon	16,384
trite diezeugmenon (= diatonic paranete synemmenon)	17,496
paramese	18,432
trite synemmenon	19,683
mese	20,736
diatonic lichanos meson	23,328
chromatic lichanos meson	24,576
parhypate meson	26,244
hypate meson	27,648
diatonic lichanos hypaton	31,104
[chromatic lichanos hypaton (note not specified by Thrasyllus)]	32,768
parhypate hypaton	34,992
hypate hypaton	36,864
proslambanomenos	41,472

Theon now resumes his consideration of the "intelligible" harmonia of the cosmos by further defining various groups of four, each of which is a tetraktys, and exploring in some detail the components of the most important of these, the tetraktys of the decad (subjects 37–49). Theon identifies the second tetraktys, the double and triple multiples of the psychogony in Plato's *Timaeus* (see p. 410 *supra*), as nearly equal in importance to the tetraktys of the decad because the two of them together encompass "the musical, geometric, and arithmetic ratios of which the harmonia of the universe is composed."[135] The tetraktues can be readily summarized as follows:

---

[134] For a similar numerical display, see the *Harmonica introductio* of Gaudentius (pp. 504–5 *infra*).

First tetraktys	the decad: 1, 2, 3, 4 (1 + 2 + 3 + 4 = 10)
Second tetraktys	duple and triple multiples: 1, 2, 4, 8; 1, 3, 9, 27 (i.e., unity, side, square, cube)
Third tetraktys	magnitudes: point, line, plane, solid
Fourth tetraktys	simple bodies: fire (equivalent to 1), air (2), water (3), earth (4)
Fifth tetraktys	forms of simple bodies: pyramid (equivalent to fire), octahedron (air), icosahedron (water), cube (earth)
Sixth tetraktys	growth: seed (equivalent to 1), growth in length (2), growth in width (3), growth in thickness (4)
Seventh tetraktys	societies: man (equivalent to 1), family (2), village (3), city (4)
Eighth tetraktys	faculties of judgment: intellect (equivalent to 1), science (2), opinion (3), and sense (4)
Ninth tetraktys	animals: the three parts of the soul (rational, thymic, and epithymetic) and the body
Tenth tetraktys	seasons: spring, summer, fall, and winter
Eleventh tetraktys	ages: childhood, adolescence, maturity, and old age

Tetraktues 3–7 are defined by Theon as material and sensible, and all of them are seen as harmonically arranged in the composition of the universe. Nevertheless, the first tetraktys remains the most important because of its symbolic return to unity in the sum of its numbers.[136]

Theon's treatment of the mystical properties of each of the numbers from 1 to 10 is similar to treatments preserved in Plutarch's *De animae procreatione in Timaeo,* Aristides Quintilianus's *De musica* (especially 3.6), and the Θεολογούμενα ἀριθμητικῆς sometimes attributed to Iamblichus. 1 is, of course, given priority because everything is seen as emanating from it; indeed, it is not really a number but the generator of number. 2 represents the first possibility for motion, multiplication, addition, composition, and relationship. 3 represents the first plane figure because it accommodates length and breadth, while 4—the first square number—represents the simplest solid figure, a triangular pyramid with four faces and four apexes. 5 is the mean term between any two terms whose sum is 10, and it is the first to embrace the smallest even and odd numbers, 2 and 3. 6, the first number to be the sum of its aliquot parts (i.e., 1 + 2 + 3 = 6), is also the first number capable of illustrating all three means between two extremes—a point to which Theon will later return—and is symbolic of marriage.[137] 7, as a prime number, is not the product of any two smaller numbers and it cannot be multiplied to produce any other number in the decad. Nevertheless, it came to be associated with the minimum number of months of gestation for a living fetus (and the minimum number of weeks in which the fetus is fully formed), the number of years for the full development of teeth, and in various multiples, the number of years marking important life cycles, the number of orifices in the head, the number of viscera, and so on. 8 is the first cube (and the number of spheres in the universe), while 9 is the first odd square. And 10, finally, contains "the nature of both even and odd number, motion and absence of motion, good and evil."[138]

---

[135] τούς τε μουσικοὺς καὶ γεωμετρικοὺς καὶ ἀριθμητικοὺς λόγους περιέχουσαι, ἐξ ὧν καὶ ἡ τοῦ παντὸς ἁρμονία συνέστη (Hiller 96.10–12).

[136] In other words, 10 represents a return to 1 at a new level, that of tens: 10 is 1 ten, 20 is 2 tens, 30 is 3 tens, and so on. Likewise, 100 represents a return of 1 at the level of hundreds, and so on.

In subjects 50–61, Theon introduces the names of the various plane and solid figures and the six proportions with which the Pythagoreans were much concerned, showing how they are all related through the principle of equality and how the mean terms may be discovered. All these proportions and means, as well as four others, are also described in Nicomachus's *Introductio arithmetica* 2.22–28. Theon's illustrations are conveyed through simple numerical examples intended to illuminate rather confusing prose descriptions, but the essence of the descriptions can be most efficiently captured in algebraic terms.

---

[137] Aristides Quintilianus (*De musica* 3.12–13) makes considerable use of the number 6 in his exploration of the metaphysical properties of music. Various reasons are given for associating the number 6 with marriage, but the most common are those viewing it as a product of the numbers 3 and 2, which are in turn associated with male and female, ethereal and material, and so on. For further references, see Mathiesen, *AQ on Music,* 40–44 and 167–69; Ernest G. McClain, "Musical 'Marriages' in Plato's Republic," *Journal of Music Theory* 18 (1974): 242–72; and A. J. H. Vincent and T. Henri Martin, *Passage du traité de la musique d'Aristides Quintilien relatif au nombre nuptial de Platon. Traduit et annoté. Suivi de deux notes de Th. Henri Martin, l'une sur l'époque de Aristide Quintilien et sur celle de l'astronome Claude Ptolémée* (Rome: Impr. des sciences mathématiques et physiques, 1865).

[138] ἐμπεριέχουσα πᾶσαν φύσιν ἐντὸς αὐτῆς, ἀρτίου τε καὶ περιττοῦ κινουμένου τε καὶ ἀκινήτου ἀγαθοῦ τε καὶ κακοῦ (Hiller 106.7–10).

Proportion	**Terms** $x > y > z$	**Example** x y z
arithmetic	$(x - y) = (y - z)$ or $x + z = 2y$	3 2 1
geometric	$x/y = y/z$ or $xz = y^2$	4 2 1
harmonic	$x/z = (x - y)/(y - z)$ or $(x + z)y = 2xz$	6 4 3
subcontrary	$x/z = (y - z)/(x - y)$	6 5 3
fifth	$y/z = (y - z)/x - y)$	5 4 2
sixth	$x/y = (y - z)/(x - y)$	6 4 1

Mean	**Formula**
arithmetic	$y = z + \left(\frac{x - z}{2}\right)$ or $y = \frac{x}{2} + \frac{z}{2}$ or $y = \frac{x + z}{2}$
geometric[139]	$y = \sqrt{xz}$
harmonic	$y = z + \frac{z(x - z)}{x + z}$

Theon does not give formulas for computing the subcontrary, fifth, or sixth means, although they can easily be deduced.[140]

At this point, Theon rather abruptly concludes the musical section and passes to the section on astronomy. As noted above, most of the surviving manuscripts of Theon's treatise do not include the section on astronomy. There are, however, two parts of the astronomical section that bear directly on music. The marginal *custodes* give the subjects as "On the position of the planets" and "Matters pertaining to the myth of Pamphylian in the *Respublica.*" The second of these simply quotes Plato's famous description (*Respublica* 10.14) of the planetary circles and the sphere of the stars, on each of which was seated a Siren, emitting a single tone. The eight tones together formed a perfect harmonia.

---

[139] Recognizing that the product of the extremes will not always be a square number, Theon supplies a geometric in addition to the arithmetic demonstration.

[140] For a fuller discussion of the basic Pythagorean proportions and means, see Heath, *Greek Mathematics*, 1:84–115 and 2:238–44; and Barbera, "Pythagorean Mathematics," 42–49 and 179–85. See also pp. 362–63, 400–401, and 422 *supra*.

The myth of Pamphylian is introduced, it would seem, as Theon's way of correcting Alexander of Aetolia's rather poetic description of the seven planets and their subsequent arrangement with the earth and the starry sphere, which he quotes (or paraphrases) in the previous subject. The arrangement is shown in figure 62.

Alexander of Aetolia's Verse

Sphere of the stars, giving the nete synemmenon		
	semitone	fourth
Sphere of Kronos		
	semitone	
Sphere of Zeus		
	semitone	
Sphere of Ares		
	tone	
Sphere of the Sun, giving the mese		
	trihemitone	fifth
Sphere of Aphrodite		
	semitone	
Sphere of Hermes		
	semitone	
Sphere of the Moon		
	tone	
Sphere of the Earth, giving the hypate		

Figure 62.

Theon does not allow this arrangement to stand unchallenged. He proceeds to correct Alexander's observations, noting that the hypate sounds a fourth with the mese; the upper note should be the nete diezeugmenon, if the overall scale is to form an octave; as an immobile object, the earth should render no sound; and the arrangement of intervals produces neither the diatonic nor chromatic genera. By contrast, Eratosthenes, according to Theon, proposed the initial order of earth, moon, sun, and Hermes, while the "mathematicians" (μαθηματικοί) preferred the order moon, sun, Hermes, Aphrodite (some exchange the positions of Hermes and Aphrodite), Ares, Zeus, Kronos, and the starry sphere. The intervallic pattern in Alexander's verse does seem problematic, but the order of planets no doubt represents the same early tradition exhibited in fragment 3 of the Nicomachean *Manuale harmonicum* (cf. *Manuale harmonices* 3) and Boethius's *De institutione musica* 1.27.[141]

Theon of Smyrna's *Expositio rerum mathematicarum ad legendum Platonem utilium*, for all its imperfections, represents a type of Platonic handbook for which there was considerable demand in the second century. Aristides Quintilianus almost certainly relied on it for some of the material in Book III of his *De musica*, and together with the treatises of Nicomachus, the *Expositio* exerted a good deal of influence on the development of neo-Platonism. The large number of surviving manuscripts of the *Expositio* attests to its continuing popularity well into the Renaissance.[142]

Claudius Ptolemy

Perhaps second only to Aristoxenus, the figure of Claudius Ptolemy dominates the history of ancient Greek music theory, especially as it was conceived by Latin, Byzantine, and Arabic writers of the Middle Ages and the Renaissance. Ptolemy's detailed discussion of various tuning systems, as well as his knack for simplifying and systematizing the apparently diverse testimony of earlier theorists, gave his *Harmonica* particular appeal to later writers for whom ancient Greek music theory was a matter of scholarly interest rather than a matter of immediate philosophical concern—as it had been for Aristoxenus—or the preservation of a relatively recent cultural past—as it was for writers such as Plutarch, Cleonides, and Ptolemy himself. Modern scholarship, too, has favored Ptolemy's treatise to the extent of adopting substantial portions of the *Harmonica* as if it represented actual musical practice and a stable and consistent theory shared by any number of ancient writers.[143]

---

[141] For a fuller discussion of this passage, see Thomas J. Mathiesen, "Music, Aesthetics, and Cosmology in early Neo-Platonism," in *Paradigms in Medieval Thought: Applications in Medieval Disciplines*, ed. Nancy van Deusen and Alvin E. Ford, Medieval Studies, vol. 3 (Lewiston, N.Y.: Edwin Mellen Press, 1990), 37–64. See also pp. 396–97 and 408–9 *supra.*

[142] For an overview of Theon's significance, see Dillon, *Middle Platonists,* 397–99. On the influence of neo-Platonism in Renaissance music (here too, without much specific reference to Theon), see Tomlinson, *Music in Renaissance Magic;* and Moyer, *Musica scientia.*

This assessment of Ptolemy's *Harmonica*, however, ignores his well-known reputation for adapting the work of earlier authors to produce an ideal and efficient system of his own conception. His most famous treatises, the *Almagest* and the *Geographica*, have been shown to represent a summation of earlier astronomical and geographical observations, rather than Ptolemy's original work, and they frequently contain—at least as preserved in modern times—erroneous or anomalous data.[144]

Whether or not Ptolemy's *Harmonica* deserves a position of special authority as a treatise on ancient Greek music theory, it was already thought sufficiently important in the third century C.E. to earn an extended commentary by Porphyrius. Boethius adopted portions of it in the sixth century in his *De institutione musica*, as did Al-Fārābī in his tenth-century *Kitāb al-mūsīqī al-kabīr* and Bryennius and Pachymeres in the late thirteenth and early fourteenth centuries in their treatises. Moreover, the *Harmonica* was very widely circulated in manuscript. Many of the musical humanists relied on it in their own musical writings, and it has been the subject of extensive scholarship from that time to the present day.

Although Ptolemy is certainly one of the most famous scientists and scholars in the fields of astronomy, geography, and astrology, not to mention music, almost nothing is known about his life. He was probably born at Ptolemaïs in Egypt; one Arabic tradition supposes that he lived to the age of 78. The latest recorded observation in the *Almagest* would seem to date from 151 C.E., and as Ptolemy refers to the *Almagest* in the *Geographica* and the *Tetrabiblos*, it is not unreasonable to suppose that he lived at least into the 160s. The tremendous amount of detail contained in all his treatises suggests access to a large library. It would therefore seem probable that Ptolemy had some connection with the Museum and Library at Alexandria.[145]

---

[143] The number of examples could be easily multiplied, but as typical cases, one might mention the treatments of Isobel Henderson, R. P. Winnington-Ingram, Albrecht Riethmüller and Frieder Zaminer, and M. L. West (see chapter 1, nn. 31–36).

[144] There is a vast quantity of scholarship on this subject. For a review, see S. J. Goldstein, "Problems Raised by Ptolemy's Lunar Tables," *Journal for the History of Astronomy* 13 (1982): 195–200. Owen Gingerich ("Was Ptolemy a Fraud?" *Quarterly Journal of the Royal Astronomical Society* 21 [1980]: 253–66) concludes that Ptolemy simply selected data to fit his theories.

Several versions of a Byzantine scholion to the last part of Ptolemy's *Harmonica* assert that he died before completing it; while this could certainly explain its unfinished state, there is no way of knowing whether the assertion is true. It certainly is true, though, that the *Harmonica* remained in an incomplete state until the fourteenth century, when it received extensive text critical work at the hands of Nicephorus Gregoras (1295–ca. 1359) and his student Isaac Argyros.

As it survives even in the earliest manuscripts, the *Harmonica* is comprised of three books, and as restored by Gregoras and Argyros, each book contains sixteen chapters. In his edition of 1930,[146] Ingemar Düring arranged eighty-four manuscripts into three large classes: **m**, which he considered to represent the purest though incomplete version of Ptolemy's original treatise; **f**, an early Byzantine attempt at completing and emending the text; and **g**, representing the text critical work of Gregoras, which drew readings from both the **m** and **f** classes, favoring the readings of the **m** class and offering numerous emendations and "corrections" to the text. In addition, a subclass of **g** (labeled **A**) comprises three manuscripts representing Argyros's own version of the text of Gregoras, this time favoring the readings of the **f** class. Düring also acknowledged that seven of the manuscripts could not be readily placed in any of the classes; these he considered to be of a "mixed type."

In fact, there are ninety-two codices containing all or part of the *Harmonica*: eighty-four preserve the complete treatise and in one case, Matritensis gr. 4713,[147] two versions; an additional five codices contain only Book I (sometimes in fragment) or Book III;

---

[145] The most detailed discussion of the evidence for Ptolemy's biography is Franz Boll, *Studien über Claudius Ptolemäus. Ein Beitrag zur Geschichte der griechischen Philosophie und Astrologie* (Leipzig: B. G. Teubner, 1894). See also P. Leander Schönberger, O.S.B., *Studien zum 1. Buch der Harmonik des Claudius Ptolemäus*, Beilage zum Jahresbericht des humanistischen Gymnasiums Metten (Augsburg, 1914).

[146] See chapter 1, n. 20 *supra*. For a complete list of editions and translations, see the Bibliography under "Ptolemy."

[147] See Mathiesen, *RISM BXI*, **62**.

and three codices contain only Book III, chapter 16. While Düring's three classes do represent in general the various states of the *Harmonica*, they are not as neat as he suggests, and his assignment of manuscripts to one or another of the classes does not always withstand scrutiny.

The earliest codex containing the *Harmonica* is Venetus Marcianus gr. app. cl. VI/10, the primary exponent of Düring's **m** class. Once part of Vittorino da Feltre's library in Mantua, this codex of the late twelfth century was subsequently owned by George Trivizias, a Uniate priest associated with Cardinal Bessarion. The codex eventually passed into the collection of the monastery of St. Michael in Murano, and in the late eighteenth century, it was finally transferred to the Marciana.[148] Three thirteenth-century codices—Vaticanus gr. 186, 191, and 192—represent a state of the text similar to that of Venetus Marcianus gr. app. cl. VI/10, but they are certainly not copied from it. In these early manuscripts, many of the chapter headings in Books II and III have been omitted, chapters 9–14 (or 10–14 in Vaticanus gr. 191) of Book III have been elided, and Book III ends with a fragment of chapter 14. The tables of genera and tonoi that form an important part of Book II, chapters 14–15, have been omitted in Venetus Marcianus gr. app. cl. VI/10 and Vaticanus gr. 186. Space has been provided for them, however, and they are present in the other two codices, albeit in an incomplete form.[149] They may have been present in some form in earlier manuscripts that no longer survive, but it is more likely that these are the first stages of their reconstruction.

The earliest exponent of Düring's **f** class is Monacensis gr. 361a, a codex comprised of fascicles ranging in date from the thirteenth through the sixteenth century. The first book of Ptolemy's *Harmonica* was copied in the late fifteenth century, while the second and third books were copied in the thirteenth century. The primary distinguishing features of this class are the presence of a considerable number of scholia and a passage in the middle of chapter 9 of Book III that becomes chapter 16 of Book III in the **g** class. This latter characteristic does not, however, appear at all in nine of the manuscripts Düring assigns to his **f** class, and in five of them, the passage is placed in the margin as if it were a scholion.[150] Moreover, a number of the manuscripts in the **f** class include chapters 14–16 of Book III, a primary characteristic of the **g** class, while others do not. The tables missing in the manuscripts of the **m** class are sometimes present in the **f** class, but here too, they are often absent or incomplete. On the other hand, manuscripts of the **f** class exhibit numerous additional diagrams and charts not included in any modern edition.

---

[148] See ibid., 273.

[149] For full descriptions, see ibid., 210 and 214–15.

In Düring's **g** class, the *Harmonica* takes on the complete form in which it has come to be generally known. This class is based on a large fourteenth-century codex, Vaticanus gr. 198, which also includes Nicomachus's *Introductio arithmetica* and *Manuale harmonices*, Porphyrius's commentary on Ptolemy's *Harmonica*, the *Harmonica* of Manuel Bryennius, Ptolemy's *Almagest*, and a considerable number of mathematical and astrological treatises. According to a scholion found in a number of the manuscripts,[151] Nicephorus Gregoras edited and corrected the entire treatise, as well as completing the missing chapters 14–15 of Book III. In addition, he moved the interpolation or marginal annotation to Book III, chapter 9, found in some of the f-class manuscripts, to the end of the treatise, where it became chapter 16, the final chapter. Somewhat later, Argyros, in his own version, filled the apparent lacuna in Book II, chapter 14, and this version is preserved in three codices: Vaticanus gr. 176 and Norimbergensis gr. Cent. V app. 38 of the fourteenth century and Parisinus Supplementarius gr. 449 of the fifteenth century.[152]

Gregoras's great opponent, the monk Barlaam of Calabria, objected to his completion on the grounds that the language is not Ptolemy's, the planetary associations are incomplete or inconsistent with Ptolemy's earlier treatments, and the initial words of chapter 16, "Let no one think (Μή τις δὲ οἰέσθω)" cannot be the beginning of a chapter since they imply some preceding text. Although Barlaam's refutation (’Ανασκευὴ εἰς τὰ προστεθέντα τρία κεφάλαια ταῖς τελευταίαις ἐπιγραφαῖς τοῦ τρίτου τῶν τοῦ Πτολεμαίου ἁρμονικῶν Βαρλαὰμ μοναχοῦ) is not entirely convincing, it does provide an example of the seriousness with which Byzantine scholars viewed their work on the corpus of ancient Greek music theory.[153]

---

[150] See ibid., **31**, **45**, **102**, **179**, and **227** (passage added in margin); and **137–38**, **211–12**, **217**, **237**, and **289–91** (passage not present).

[151] This scholion exists in several forms. For transcriptions, see Düring, *Harmonielehre*, lxxx–lxxxii.

[152] For full descriptions, see Mathiesen, *RISM BXI*, **27**, **114**, and **208**.

While the state of the manuscripts does leave some uncertainty about particular details of the content and structure of Ptolemy's *Harmonica*, its overall design and approach are clear. The following outline shows the order and arrangement of the three books.

	Book I	**Book II**	**Book III**
1	Concerning criteria in harmonics.	How the ratios of the customary genera could be recognized as well by the senses.	How in general one could both use and judge the ratios by means of the fifteen-string canon.
2	What is the business of the Harmonicist?	Concerning the use of the canon in comparison to the so-called Helicon instrument.	Methods with regard to the division up to the double octave, through only eight notes.
3	How height and depth are established with regard to sounds.	Concerning species in the primary consonances.	In what sort of genus one must establish harmonic function and its science.
4	Concerning notes and the differences among them.	Concerning the perfect system and that only this is a double octave.	That the function of harmoniousness is immanent in all things more perfect by their natures, but it appears most especially in human souls and the rotations of the heavens.

---

[153] The refutation is preserved in at least twelve manuscripts (see Mathiesen, *RISM BXI*, **75**, **152**, **178**, **182**, **202**, **276**, **283**, **211–12**, **217**, **255**, and **265**). Contrary to Düring's assertion (p. xc), it is not included in Parisinus Coislinianus gr. 172. Barlaam's dispute with Gregoras grew out of his opposition to the hesychast movement, which was particularly associated with the monastery on Mt. Athos and defended by Gregory Palamas and, at first, Nicephorus Gregoras. Barlaam was eventually excommunicated for his opposition to hesychasm. For a survey of this controversy, see George Ostrogorsky, *History of the Byzantine State*, rev. ed., trans. Joan Hussey (New Brunswick, N.J.: Rutgers University Press, 1969), 512–22. Barlaam's refutation of Gregoras's completion of the *Harmonica* is included in Düring, *Harmonielehre*, 112–21. For Düring's consideration of the controversy, see pp. lxxxiii–lxxxviii.

5	Concerning doctrines held by the Pythagoreans in their hypotheses of consonances.	How the names of the notes are taken with regard to position and function.	How consonant intervals coincide with the primary differences of the soul, with their kindred species.
6	That the Pythagoreans have improperly inquired into matters concerning the consonances.	How the conjunct magnitude of an octave-and-a-fourth has the popular repute of being a perfect system.	A comparison of the genera of harmoniousness and those corresponding to the primary virtues.
7	How the ratios of the consonances could be more wisely defined.	Concerning modulations according to the so-called tonoi.	How the modulations of harmoniousness are like the circumstantial modulations of the soul.
8	By what manner the ratios of the consonances will be irrefutably shown through the monochord canon.	That the extremes of the tonoi must be defined by an octave.	Concerning the similarity of the perfect system and the circle through the middle of the zodiac.
9	That the Aristoxenians improperly compare the consonances by intervals rather than by notes.	That only seven tonoi, equal in number to the species of the octave, must be proposed.	How the consonant and dissonant intervals of harmoniousness are similar to those of the zodiac.
10	That they do not wisely hypothesize the consonance of the fourth as two-and-a-half tones	How the excesses of the tonoi would be wisely perceived.	That the sequence of the notes is like the motion of the stars in longitude.
11	How the octave would be displayed to the senses through the eight-string canon as less than six tones.	That the tonoi must not be laid out by semitones.	How the motion of the stars in altitude is compared to the genera in harmonia.
12	Concerning the division of the genera by Aristoxenus and the tetrachords of each genus.	Concerning the inconvenience of the monochord canon.	That the modulations according to the tonoi are harmonious with the passing of the stars in latitude.

13	Concerning the division of the genera and tetrachords by Archytas.	Concerning this: Didymus the musician seems to have developed the canon.	Concerning the analogy of the tetrachords and their aspects with regard to the sun.
14	A demonstration that not one of the divisions preserves the truly emmelic.	Exposition of the numbers producing the division of the octave in the immutable tonos and each of the genera.	The stationary notes of the perfect system could be compared by certain prime numbers to the primary spheres of the stars in the cosmos.
15	Concerning the division of the tetrachords by genus according to fair reason and appearance.	Exposition of the numbers producing the divisions of the customary genera in the seven tonoi.	How the ratios of the kindred motions could be understood through numbers.
16	How many and which genera are more pleasing to the ear.	Concerning what is singable on the lyre and the kithara.	How the combinations of planets could be compared to the combinations of the notes.

In Book I, Ptolemy first provides preliminary definitions of harmonics, sound, height and depth, and consonance. This quite naturally leads him to a consideration of Pythagorean and Aristoxenian definitions of consonance and particularly their divisions of the tetrachord and octave, represented respectively by divisions attributed to Archytas and to Aristoxenus himself. All this is neatly arranged in seven pairs of chapters. By showing that the conclusions of his predecessors were unsatisfactory, Ptolemy sets up the eighth pair of chapters, which introduce his own ideal system—a system he will develop more fully in Book II. There is, however, more to the design of Book I than a simple exposition of technical detail.

The sixteen chapters of Book I seem to group themselves into eight pairs, and it may be no coincidence that the first sentence, which provides definitions of harmonics and sound, is comprised of two phrases of fifteen and eleven words. The eight pairs of chapters may suggest the eight notes of the octave, which Ptolemy considers the most perfect of the consonances, and the fifteen words of the first phrase may well remind the reader of the fifteen notes of the perfect system, which Ptolemy describes in Book II, chapter 4, while the eleven words of the second phrase suggest the conjunct system of an octave-and-a-fourth, which Ptolemy treats in Book II, chapter 6.[154]

Whether or not these numerical patterns are intentional, the subjects of the eight structural pairs of chapters in Book I can be defined as follows:

1. On harmonics and sounds (chapters 1–2)
2. On the different characteristics of sounds and notes (chapters 3–4)
3. On Pythagorean consonances (chapters 5–6)
4. How to define the consonances more accurately (chapters 7–8)
5. On Aristoxenian consonances (chapters 9–10)
6. Against the integer analysis of Aristoxenus (chapters 11–12)
7. Against the proportional analysis of Archytas (chapters 13–14)
8. On the proper divisions of the tetrachord (chapters 15–16)[155]

In other words, Ptolemy devotes Book I to defining the topic in broad terms and summarizing the methods and conclusions of his predecessors, while also showing that they are unsatisfactory. This allows him then to describe his own ideal system, which will be more fully developed in Book II.

Ptolemy's treatment of each subject in Book I reveals his characteristic interest in detail. He begins abruptly by defining harmonics as a "function perceptive of the differences among sounds with respect to high and low; sound is an effect of beaten air—the first and most fundamental of things heard."[156] This definition does not recall in any way the seven Aristoxenian categories of harmonics or even Aristoxenus's own somewhat more general definition of harmonics as pertaining to the theory of scales and tonoi. From the very beginning, Ptolemy parts company with those for whom harmonics is primarily the study of **musical** phenomena as judged by the senses.

---

[154] For a more detailed investigation of these matters, see Jon Solomon, "A Preliminary Analysis of the Organization of Ptolemy's *Harmonics*," in *Music Theory and Its Sources: Antiquity and the Middle Ages*, ed. André Barbera (Notre Dame, Ind.: Notre Dame University Press, 1990), 68–84. Some manuscripts, however, add the particle μέν at the beginning of the first phrase or delete one of the definite articles (τό); either of these changes spoils the pattern.

[155] Adapted from Solomon, "Preliminary Analysis," 81.

[156] ῾Αρμονική ἐστι δύναμις καταληπτικὴ τῶν ἐν τοῖς ψόφοις περὶ τὸ ὀξὺ καὶ τὸ βαρὺ διαφορῶν, ψόφος δὲ πάθος ἀέρος πλησσομένου—τὸ πρῶτον καὶ γενικώτατον τῶν ἀκουστῶν (Düring 3.1–3).

Two criteria pertain to harmonics: hearing, which is fit to judge matter and effect, and reason, which is suited to judge species and cause. Hearing, like the other senses, is approximate and needs to be bounded and guided by reason. After providing a number of examples of the limitations of the senses, Ptolemy then draws an image of hearing and sight as servants of the theoretical and rational part of the soul; reason judges their evidence, and they agree with the judgment of reason.

With this relationship established, Ptolemy introduces in the second chapter the "harmonic canon" (κανὼν ἁρμονικός), which provides an accurate measure that can be applied as a corrective to the deficiencies of sense perception. Ptolemy is clear, however, that in a proper theory, the evidence of the senses and the evidence of reason will accord: their judgments apply to different aspects, but all "the works of nature have been crafted with some reason and an orderly cause, and nothing is produced by nature at random or as happenstance."[157] The Pythagoreans made the mistake of ignoring the evidence of the senses and described musical intervals with ratios that were at variance with the phenomena. The Aristoxenians, for their part, regarded reason as merely incidental and applied numbers not to the pitches that define the intervals but to the intervals themselves. The problems with both these approaches will be more fully elucidated, Ptolemy promises, but first he must define the characteristics of sounds and notes, the subject of chapters 3 and 4.

Ptolemy avoids the typical descriptions of sounds and notes that appear in many of the Aristoxenian treatises, choosing instead to explore some of the reasons for the different qualities of sound: smooth and rough, loud and soft, light and forceful. While these qualities are related to material characteristics and conditions, an additional pair—high and low—is taken by Ptolemy to be a quantity rather than a quality. In this, he shares the view of earlier theorists who had noted that pitch is a matter of frequency of vibration.[158] It then remains for Ptolemy to observe—as had

---

[157] τὰ τῆς φύσεως ἔργα μετὰ λόγου τινὸς καὶ τεταγμένης αἰτίας δημιουργούμενα καὶ μηδὲν εἰκῆ, μηδὲ ὡς ἔτυχεν ἀποτελούμενον ὑπ' αὐτῆς (Düring 5.20–22). Theon of Smyrna also regards music as comprised of both a sensible and an intelligible part (see p. 415 *supra*).

[158] Cf. especially the introduction to the *Sectio canonis* and Nicomachus *Manuale harmonices* 4 (see pp. 346–47 and 397 *supra*). Many of the points made in

Aristoxenus—that height and depth of pitch are potentially unlimited, but in practical terms, there are limitations. Even here, however, the limitations of hearing are still greater than the limitations of instruments and, by extension, of the voice itself.

Within the spectrum of high and low, sounds can be identical (isotonic [ἰσότονος]) or different (anisotonic [ἀνισότονος]) in pitch. If they are different, they can be continuous or discrete. Continuous sounds have nothing to do with harmonics, Ptolemy states, while discrete sounds, which he calls "notes" (φθόγγοι), are properly part of harmonics because they can be related one to another in ratio on the basis of their respective quantities. Musical (ἐμμελεῖς) notes are those that fit together in a manner pleasing to the ear, while unmusical (ἐκμελεῖς) notes are the opposite. Ptolemy concludes chapter 4 by observing that the term "consonant" (σύμφωνος) is derived from the term "voice" (φωνή), which refers to the most beautiful of the sounds. In reference to notes, "consonant" means that they strike the ear as similar.

These characterizations are reminiscent of earlier and contemporary treatises, but they also exhibit some striking differences. For Aristoxenus, consonance and the musical or unmusical character of notes are certainly matters involving the ear, but they are fundamentally defined by a larger musical logic. The Pythagoreans, for their part, are largely unconcerned with questions of musicality and sensory perception, considering consonance to be defined by higher numerical truths. Ptolemy is dissatisfied with both positions, and in the next four chapters, he takes up the Pythagorean view and shows its weaknesses.

Ptolemy's survey of the traditional Pythagorean definitions of the consonant intervals (the fourth, the fifth, the octave, the octave-and-a-fifth, and the double octave) could have been based on a treatise such as the *Sectio canonis*, a significant portion of which Porphyrius provides as part of his commentary on chapter 5, or Theon of Smyrna's *Expositio* or perhaps some other similar treatise. Ptolemy makes a point, however, of the Pythagoreans excluding the interval of an eleventh—i.e., the octave-and-a-

---

this chapter could be derived from the Aristotelian *De audibilibus*, which is preserved only in Porphyrius's commentary on Ptolemy's *Harmonica* (see chapter 6, pp. 509–20 *infra*). Flora Levin provides a detailed study of the treatments of Nicomachus and Ptolemy in her "πληγή and τάσις in the Harmonika of Klaudios Ptolemaios," *Hermes* 108 (1980): 205–29.

fourth—from the consonances because its ratio (8:3) was neither multiple nor superparticular. While this interval was indeed implicitly excluded in the *Sectio canonis*, both Theon of Smyrna and Gaudentius accepted it as a consonance.[159] In any case, Ptolemy will base some of his criticism of the Pythagoreans on the exclusion of the eleventh as a consonance.

Ptolemy regards the pitches forming the interval of an octave as homophones (ὁμόφωνοι) and therefore as functionally identical. Other intervals are either consonant, such as those already identified, or musical, such as the "whole-tones and the rest of the intervals of that sort."[160] In consequence, a note that forms the consonant interval of a fourth with the upper note of an octave forms by extension the same functional interval with the lower note. The same is true for the fifth and the octave-and-a-fith. Thus, the compound fourth and the compound fifth must be consonant, just as are the simple fourth and fifth. That the compound fifth should be consonant merely because it is in a multiple ratio (3:1), while the compound fourth should be dissonant because its ratio is neither multiple nor superparticular, Ptolemy considers illogical, and he rejects the premise by considering these intervals as compounds.

Other weaknesses and inconsistencies are found in the Pythagorean tradition. First, there was the Pythagorean exclusion from the consonant realm of multiple and superparticular ratios those that extended beyond the number 4—5:4 and 5:1, for instance. Second, the Pythagoreans employed a procedure for determining the relative consonance of intervals. In this procedure, a ratio of unity (1:1) was subtracted from the ratio of a musical interval and the smaller the sum of the remaining numbers, the more consonant the interval.[161] Ptolemy correctly observes that this procedure works only for ratios expressed in their smallest terms, but even in this case, he thinks it is false because it defines the interval of an octave-and-a-fifth as more consonant than the interval of the fifth. In terms of pure acoustics, however, the octave-and-a-fifth is in fact the purer interval, and this may well be the point of the Pythagorean demonstration. Likewise, the octave-and-a-fourth, while certainly consonant in terms of Ptolemy's definitions, does occur later in the harmonic series than any of the other intervals accepted as consonant by the Pythagoreans, and in pure acoustic terms is relatively more dissonant than any of them.

---

[159] See pp. 417–19 *supra* and 503 *infra*.

[160] οἱ τονιαῖοι καὶ τῶν τοιούτων οἱ λοιποί (Düring 15.15).

[161] For example, in the ratio 2:1, if 1 is subtracted from each side, a total of 1 is left; subtracting 1 from each side of the ratio 3:2 leaves 2 and 1, for a sum of 3; in the case of 4:3, the sum is 5; in the case of 3:1, the sum is 2; in the case of 4:1, the sum is 3; and so on.

While Ptolemy regards the procedure of subtracting unity from ratios as fundamentally flawed, he does accept the notion that the closer an interval is to unity, the more consonant it will be. The ratio of the octave, 2:1, is nearest to equality "because its excess is equal to and the same as the amount exceeded";[162] as a compound of the octave, the double octave would be the next most consonant interval. Next in order are the sesquialteran and sesquitertian ratios, the fifth and the fourth, not because these intervals are themselves near equality but rather because they are superparticular ratios that divide the octave most nearly into two equal parts. A compound of the octave with the fourth or fifth forms the next pair of consonant intervals, for the reasons already explained. These are followed by the "musical" ratios, that is, superparticular ratios corresponding to intervals smaller than the fourth—intervals such as the tone (9:8) and "as many as make up the smallest of the consonances."[163] Ptolemy is not explicit at this point, but the phrase allows for the variously sized tones such as 10:9 and 11:10 he will later introduce.

As a conclusion to his review of Pythagorean theories of consonance, Ptolemy turns to the canon, which as he noted in chapter 2 should be used to correct any deficiencies in sense perception. By explicitly rejecting other instruments of measurement such as the aulos, the syrinx, weights attached to strings, percussion of hammers, disks of different sizes, and vessels filled with different quantities of liquid, Ptolemy certainly recalls the history of the discovery of musical ratios by Pythagoras and others as told by Nicomachus and especially Theon of Smyrna.[164] Ptolemy's use of the canon is, however, rather different from the divisions described in the *Sectio canonis* or in Theon of Smyrna's *Expositio*; he is not interested at this point in defining the locations of all the notes in

---

[162] τὴν ὑπεροχὴν ἴσην ἔχων καὶ τὴν αὐτὴν τῷ ὑπερεχομένῳ (Düring 15.25).

[163] ὅσοι συντιθέασι τὴν ἐλαχίστην τῶν συμφωνιῶν (Düring 16.15–16).

[164] See pp. 399 and 418–19 *supra*.

the Greater or Lesser Perfect Systems but only in demonstrating the various basic proportions and intervals. He begins this task by insuring that the string of the monochord and the bridges are functioning properly. This is done by dividing the string in half. The halves are then compared one to another, and if the tones produced are unison, the string is true.[165] From this point, each half functions as an independent string, and each half, subdivided into various smaller divisions, represents a side of the ratios 4:3, 3:2, 2:1, 8:3, 3:1, and 4:1. Sounding any of the segments on one half against any of the segments on the other half will then produce the expected interval.

Using this demonstration as a point of transition, Ptolemy concludes that the Pythagoreans were correct in their discovery of the ratios of concords, even if they misunderstood their causes and consequently erred in some of their assumptions. The Aristoxenians, on the other hand, are charged with rejecting the fundamental Pythagorean ratios and failing to supply any reasonable alternative. In particular, the Aristoxenian tradition of conceptualizing intervals in linear rather than arithmetic terms is the subject of special criticism in chapters 9 and 10.

According to Ptolemy, the Aristoxenians regarded notes as bodiless (ἀσώματοι) and the intervals themselves as bodies (σώματα). This makes no sense to Ptolemy because, in the first place, the character of an interval is defined by the relationship between the two notes that form it; indeed, without two notes, there could be no interval. In the second place, if the intervals were envisioned on a canon, the linear quantity of two comparable intervals would differ if one were formed by a pair of higher pitches (say, f and c') and the other by a pair of lower pitches (say, c and g).

Aristoxenus would certainly have agreed that intervals are defined by notes, and as his descriptions of intervals are idealizations of phenomena, he is never concerned with comparing particular instances of intervals. Although Aristoxenus does state in the *Harmonica* (*De principiis*, section II/A) that earlier theorists such as Lasus and certain of the Epigonians were mistaken in thinking that a note has breadth, he does not state that a note is bodiless. In fact, his definition is purely phenomenal: "a falling of the voice on one pitch is a note."[166]

---

[165] One of the halves is itself divided in half, and these two halves are also compared to insure that the string is true. The rest of the comparisons, however, involve only the two halves of the entire string.

Ptolemy is almost certainly basing his criticism on the type of definition provided by Cleonides: "a tonos is any position of the voice, receptive of a scale, and without breadth"; or by Nicomachus: a note is "a sound without breadth, non-intervallic with respect to position," a definition he merely ascribes to "others."[167] The argument of chapter 9 of the *Harmonica* suggests that Ptolemy relied more heavily on later treatises representing to his mind the Aristoxenian tradition than he did on a careful reading of Aristoxenus's treatise itself. If so, it may explain some of the apparent misrepresentations in Book II of the *Harmonica*.

In chapter 10, Ptolemy reviews Aristoxenus's description of a method for proving that the fourth equals two-and-a-half tones and demonstrates in mathematical terms the impossibility of the proof. The *Sectio canonis* had of course already provided such a demonstration, but Ptolemy offers his own treatment in terms of specific numerical ratios, which can be summarized as follows:

the fourth = 2048:1536
is composed of
one 9:8 whole-tone = 1728:1536
a second 9:8 whole-tone = 1944:1728
the leimma (256:243) = 2048:1944
a third 9:8 whole-tone 2187:1944 is not divided in half by 2048:1944
for
20:19 < 2048:1944 < 19:18
16:15 < 2187:2048 < 15:14
19:18 < 16:15

In modern terms, this could be expressed as follows:

$$\frac{9}{8} + \frac{9}{8} + \frac{3}{\sqrt{8}} \neq \frac{4}{3} \text{ or } \frac{243}{64\sqrt{8}} \neq \frac{4}{3} \text{ or } 1.3423931 \neq 1.3333333$$[168]

Because no superparticular ratio can be divided into two equal halves (as had been demonstrated by the *Sectio canonis*), a true half tone, in Ptolemy's view, should somehow exist between the two nearly equal ratios, 17:16 and 18:17, that comprise the ratio 18:16 (i.e., 9:8). So, he proposes the ratio 258:243 on the following formulation:

---

[166] See pp. 303 and 305–6 *supra.*

[167] See pp. 372 and 404 *supra.*

[168] See Litchfield, "Aristoxenus and Empiricism," 64.

18:17 < a half tone < 17:16
$\frac{1}{17}$ of 243 < 15 < $\frac{1}{16}$ of 243
adding 15 to 243 will produce an intermediate interval

258:243 is indeed slightly larger than the leimma 256:243 in the ratio 258:256, i.e., 129:128.[169]

Ptolemy pursues this line of argument in chapter 11, which is devoted to the purportedly Aristoxenian extension of a fourth of two-and-a-half tones to an octave of six tones. It also provides as a kind of excursis the extraordinarily acute observation that the relationship between pitch and the tension of a string is identical to the inverse of the relationship between pitch and the diameter of a string.[170] The chapter demonstrates that the sum of six 9:8 intervals would produce an interval greater than an interval in the ratio 2:1, with the difference between them close to the ratio 65:64. Ptolemy is much more prolix, but his demonstration amounts to the same proof already provided by the *Sectio canonis* in propositions 9 and 14. In the *Sectio canonis,* the large numbers provided in proposition 9 produce a difference in the ratio 531441:524288, which is indeed very close to the ratio 65:64 (i.e., ca. 64.8732:64).

In fact, Aristoxenus himself never claims that the octave is equal to six whole-tones, whether or not the whole-tones are in the ratio 9:8; the surviving sections of Aristoxenus's *Harmonica* are concerned almost exclusively with the interval of the fourth and the tetrachord.[171] This claim could, however, be extrapolated from his statements, and later Aristoxenian theorists such as Cleonides (*Harmonica introductio* 8), Aristides Quintilianus (*De musica* 8), and Gaudentius (*Harmonica introductio* 9) do describe the octave as containing six tones. The treatises of Aristides Quintilianus and Gaudentius are later than Ptolemy's *Harmonica*, but they must be reflecting a commonly held position, whether or not derived directly from Cleonides.[172] Here again, it seems that Ptolemy is more concerned with the representations of the contemporary Aristoxenians than he is with the writings of Aristoxenus himself.

---

[169] For a fuller explanation of Ptolemy's mathematics, see Barbera, "Pythagorean Mathematics," 306–9. For a discussion of Aristoxenus's demonstration and its meaning, see pp. 311–13 *supra.*

[170] Barbera ("Pythagorean Mathematics," 309–13) provides a detailed discussion of this matter.

[171] See pp. 332–34 *supra.*

Ptolemy concludes his critique of the Aristoxenian school by summarizing, largely without comment, the divisions of the genera. In chapter 12, he reviews the common distinguishing features of movable and immovable notes, the presence or absence of a pycnon, and the six shades, giving the divisions both in prose and in numerical terms. Aristoxenus, of course, describes his shades entirely in prose and in much more detail than is provided here. Cleonides, on the other hand, provides prose definitions that are similar to those of Ptolemy, as well as numerical representations. Ptolemy's numerical representations double the numbers provided by Cleonides, perhaps to avoid the fraction 4½, used in the description of the hemiolic color; the same doubling is used by Aristides Quintilianus (*De musica* 1.9).[173]

Ptolemy's initial discussion of the Pythagoreans concentrated on the limitations of their proportional theory of musical consonance, without any consideration of its actual application in describing the various genera. He therefore returns to the Pythagoreans in chapter 13 by criticizing the proportional divisions of the genera provided by Archytas, "who, of all the Pythagoreans, was the most devoted to music."[174] This will allow him in chapter 14 to assert that the Pythagoreans and Aristoxenians alike failed to describe the genera in a way that would accord with both sense and reason, and of course the anticipated response to such an assertion is the presentation of his own divisions in the final two chapters of Book I.

---

[172] It should be recalled that the refutation of a six-tone octave, as well as a two-and-a-half-tone fourth and a three-and-a-half-tone fifth, already appears in the *Sectio canonis*, but it cannot be stated with any certainty that Aristoxenus is the target of this refutation. See pp. 349–50 *supra*.

[173] See pp. 313 and 377 *supra* and 531 *infra*.

[174] μάλιστα τῶν Πυθαγορείων ἐπιμεληθεὶς μουσικῆς (Düring 30.9–10). Archytas, like Aristoxenus, came from Tarentum and was considered to be one of the greatest authorities on music. Plato visited Archytas in 387 B.C.E.

Archytas, according to Ptolemy, posited only the three basic genera, each of which had an interval of 28:27 at the bottom of the tetrachord. At the top of the enharmonic tetrachord, the first interval was the large 5:4, while in the diatonic it was the 9:8 whole-tone. The middle intervals, therefore, must be 36:35 in the enharmonic genus and 8:7 in the diatonic. The chromatic was defined in relation to the diatonic. The interval between the two notes falling second from the top in the diatonic and chromatic tetrachords should be the traditional Pythagorean leimma, 256:243, and this would create at the top of the chromatic tetrachord an interval of 32:27 and in the middle an interval of 243:224. Archytas, it seems, did not provide any integers to demonstrate these ratios, but Ptolemy proposes a set of smallest integers by way of demonstration:

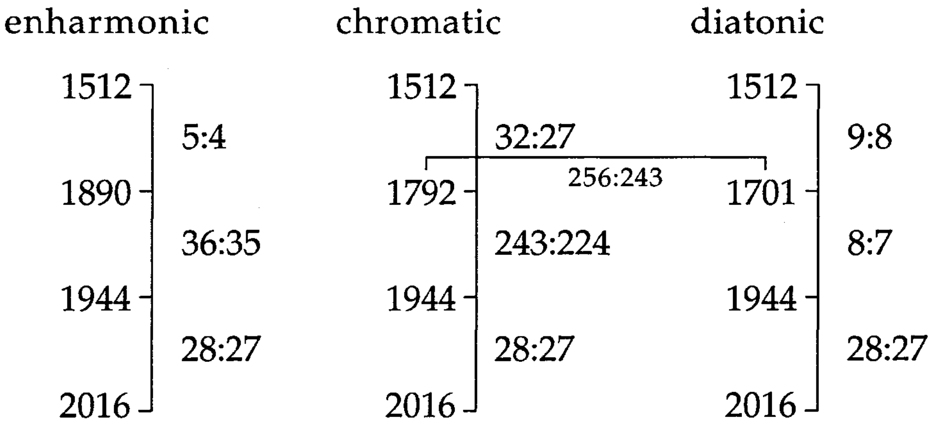


Figure 63.

In chapter 14, Ptolemy dismisses the divisions of Aristoxenus and Archytas in short order. As a Pythagorean, Archytas is assumed to accept only superparticular ratios, and the chromatic genus clearly includes two intervals that are not superparticular. Moreover, the various proportions of the two intervals forming the pycnon in the enharmonic and chromatic genus are objectionable: on the one hand, the lowest interval is too small in the chromatic genus and too large in the enharmonic; and on the other hand, the middle interval in the enharmonic is smaller than the lowest interval, when it should be either equal or larger. It is ironic, however, that Ptolemy would seem to derive these objections from the principles of Aristoxenus (*Elementa harmonica I*, section IV/C), since Ptolemy is clearly critical of the Aristoxenian tradition. Archytas is also criticized for positing only a single version of each genus, while Aristoxenus proposed too many versions of the chromatic and too few of the diatonic. Aristoxenus further erred, according to Ptolemy, in thinking that the two intervals of a pycnon could be equal and in placing the location of the parhypate in the whole-tone shade of the chromatic genus too high, thereby putting it in the same place as the parhypate of the intense shade of the diatonic genus.

Ptolemy offers no particular evidence on these points; they are simply asserted. But the assertions are necessary in order to provide grounds for the formulation of his own divisions, which—as the titles of the next two chapters state—accord with "fair reason and appearance" and are "more pleasing to the ear."

Chapter 15 is devoted to a rather complex prose description of Ptolemy's alternative divisions. Since he has earlier defined the superparticular ratios as "musical," it is reasonable for him to begin with the fundamental postulate that all the ratios defining the intervals in the tetrachord must be superparticular. To this is added the observation that the tetrachord should be divided into two or three intervals as nearly equal as possible. The number 3 is given additional significance by virtue of the fact that all the primary consonant intervals (except for the octave-and-a-fourth) differ from unity by no more than 3.[175] Finally, he posits that the lowest interval in each genus should be smaller than any of the others, that the two intervals in a pycnon should collectively be smaller than the remaining interval, and that in the diatonic genus, no one interval should be larger than the other two taken together.

At this point, the sesquitertian ratio of the tetrachord is given three basic divisions, each containing two superparticular ratios: 5:4 + 16:15, 6:5 + 10:9, and 7:6 + 8:7; there are no other possible purely superparticular divisions of the ratio 4:3. The division containing the large ratio 5:4 will, of course, represent the enharmonic genus, while the divisions involving 6:5 and 7:6 will be used for the chromatic genus. The smaller intervals must now be divided to produce the remaining intervals of the tetrachords. They could have been divided into two unequal ratios simply by doubling both terms and inserting a mean (e.g., 16:15 = 32:30, which can be divided into 32:31:30), but because Ptolemy has placed such emphasis on a tripartite division—and perhaps because he wants to emphasize inequality in the two intervals—, he triples each term and then selects the three terms that form superparticular intervals. The ratio 16:15, for example, becomes 48:45, which can be parted into 48:47:46:45, producing three nearly equal intervals. But as only two are needed to complete the tetrachord and they must both be superparticular, the pattern 48:46:45 is selected. This same procedure is repeated for the other ratios, and the ratios are demonstrated in their smallest common integers as follows:

---

[175] In the ratio 2:1, the greater term exceeds the lesser by 1, which is equal to the lesser term; in 3:2, the greater exceeds the lesser by 1, which is half the lesser; in 3:1, the greater exceeds the lesser by 2, which is double the lesser; in 4:3, the greater exceeds the lesser by 1, which is a third of the lesser; and in 4:1, the greater exceeds the lesser by 3, which is three times the lesser. See pp. 440–41 *supra*.

enharmonic	mild color	intense color
106260	106260	106260
5:4	6:5	7:6
132825	127512	123970
24:23	15:14	12:11
138600	136620	135240
46:45	28:27	22:21
141680	141680	141680

Figure 64.

These three divisions contain pycna, and Ptolemy now creates three more, each lacking a pycnon. He first proposes simply to exchange the order of intervals in his initial two-fold division. Thus, the order 5:4 + 16:15 would become 16:15 + 5:4, 6:5 + 10:9 would become 10:9 + 6:5, and 7:6 + 8:7 would become 8:7 + 7:6. Unfortunately, the first pattern does not work; if 16:15 is placed as the upper interval and 5:4 is further subdivided in the same manner as already demonstrated (i.e., 5:4 = 15:12, which can be parted into 15:14:13:12) to produce the two lower intervals, each of the resulting superparticular ratios, 15:14 and 14:12, will be larger than 16:15, and this is contrary to the pattern Ptolemy is trying to develop. The second and third pairs are more successful. 6:5 can be divided into 18:16:15 (i.e., 9:8 and 16:15) to produce the intense diatonic, and 7:6 can be divided into 21:20:18 (i.e., 10:9 and 21:20) to produce the mild diatonic.

While these patterns have a certain logical appeal, Ptolemy is confronted with the awkward fact that he has proposed a set of divisions in which the venerable ratio 9:8 never represents the upper interval. The superparticular ratio 9:8 cannot be combined with any other single superparticular ratio to produce the ratio 4:3, and it will not therefore fit into the pattern he has been trying to develop. He accordingly simply proposes to combine it with 8:7 because the two have not yet appeared together in one of his divisions. To fill out the fourth, he adds the interval represented by the ratio 28:27, producing the whole-tone diatonic. Once again, the ratios are demonstrated in their smallest common integers:

mild diatonic	whole-tone diatonic	intense diatonic
504	504	504
8:7	9:8	10:9
576	567	560
10:9	8:7	9:8
640	648	630
21:20	28:27	16:15
672	672	672

Figure 65.

These divisions in hand, formed by reason, Ptolemy concludes chapter 15 by challenging the most musical of men (οἱ μουσικώτατοι) to test them on a canon and thereby determine that sense, too, judges the divisions to be altogether satisfactory. Such a test is, of course, important because Ptolemy has earlier asserted that the evidence of reason and the judgment of sense will accord in a proper theory. The conclusion makes it clear that Ptolemy is not especially concerned with presenting here a set of divisions actually used in Greece many centuries earlier; rather, he is presenting his own theory, which he regards as superior to the patterns described by the Aristoxenian theorists or preserved in the Pythagorean tradition.

Book I draws to a close with Ptolemy's rejection of the enharmonic and mild chromatic for two reasons: first, their lower intervals are too small and, second, the intense chromatic is more agreeable to the ear because it is initially comprised of two nearly equal ratios (7:6 and 8:7). The importance of equality was established in chapter 7, and Ptolemy stresses it here as a way of providing a logical link to his formulation in this chapter of his ideally patterned genus, called the "equal diatonic" because it divides the tetrachord "into three nearly equal ratios, with equal excesses."[176]

The equal diatonic genus is a logical modification of the intense diatonic. Ptolemy takes the ratio 4:3, triples it, and inserts the intervening numbers to create the proportion 12:11:10:9—in other words, a genus composed of the pattern 10:9, 11:10, and 12:11. He recognizes that this pattern can be extended to the interval of a fifth by adding a 9:8 tone of disjunction: 9:8, 10:9, 11:10, and 12:11; and if the ratios are then repeated to extend the span to an octave, they can be demonstrated with these integers:

equal diatonic

18		20		22		24		27		30		33		36
	9:10		10:11		11:12		8:9		9:10		10:11		11:12	

Figure 66.

Ptolemy acknowledges that this genus may at first seem to have a "rather foreign and boorish character, but otherwise it is gentle, and especially when practiced by the ear."[177] He adds that, like the whole-tone diatonic, it does not shock the senses. Ptolemy advocates that the other genera be used in a mixture with the whole-tone diatonic, the softer genera in the tetrachords below the tone of disjunction and the more intense genera in the tetrachords above.

A mixing of genera was identified by Aristoxenus in his *Harmonica* (*De principiis,* section II/N) as one of the basic topics of harmonic science, but his discussion of the topic does not survive in the *Elementa,* nor does it appear to any great extent in the later Aristoxenian treatises. Ptolemy's conception, in any case, does not seem to be based on theoretical treatments but rather on practical tunings on the lyre and kithara, some of which he calls "hard" (στερεά), "mild" (μαλακά), "modal" (τροπικά), "hypermodal" (ὑπέρτροπα), and "modulatory" (μεταβολικά; associated with particular tonoi such as the Lydian and Iastian), while others are named after the notes around which they apparently center, such as "parhypatai" and "tritai." The tunings are further explored in Book II. Here, it is simply observed that the whole-tone diatonic is used alone in the hard, hypermodal, and trite tunings; it is mixed with the intense chromatic in the mild and modal tunings, with the mild diatonic in the parhypate tuning, and with the intense diatonic in modulatory tunings.

---

[176] εἰς τρεῖς τοὺς παρίσους λόγους διαιρεθέντος ἐν ἴσαις πάλιν ὑπεροχαῖς (Düring 38.16–17).

[177] ξενικώτερον μέν πως καὶ ἀγροικότερον ἦθος καταφανήσεται, προσηνὲς δ’ ἄλλως καὶ μᾶλλον συγγυμναζόμενον ταῖς ἀκοαῖς (Düring 38.30–32).

Ptolemy recognizes that the intense diatonic, which he has created by a rational process, is actually almost identical to the venerable tetrachord comprised of two 9:8 whole-tones and the leimma of 256:243. The bottom interval of the intense diatonic—16:15—is larger than 256:243 only by the very small ratio 81:80, while the upper interval of the intense diatonic—10:9—is smaller than 9:8 by the same very small ratio 81:80. In other words, the difference between Ptolemy's intense diatonic and the classic tetrachord comprised of two equal whole-tones and the leimma is negligible and would certainly not have been recognized in tuning an instrument or in singing. Indeed, Ptolemy concedes that the classic form is the one musicians "wrongly use" (καταχρωμένων).

Even though this classic form does not exhibit his logical patterns based on superparticular ratios, Ptolemy can hardly fail to accept it. He closes Book I by observing that the leimma, while not superparticular, can still be easily determined by subtracting a ditone—two 9:8 whole-tones—from the interval of a fourth. The genus does therefore exhibit a certain logic of its own, and he proposes to call it the ditonal diatonic genus.

In Book II, Ptolemy turns his attention to various means of demonstrating divisions of the tetrachord, including descriptions of the strengths and weaknesses of several types of canons; to the species of the primary consonances: the fourth, the fifth, and the octave; and to a comparison of several tunings of the genera, building on the descriptions offered in Book I. The bulk of Book II—and the part that has attracted the greatest amount of modern commentary—is devoted to a development of Ptolemy's theory of the tonoi.

Unlike Book I, Book II does not exhibit a highly systematic organization in pairs of chapters, but this may reflect the complexity of its transmission rather than Ptolemy's original intent. In two of the four earliest manuscripts, some of the chapter headings and the extensive tables that appear in chapters 14–15 in the g-class manuscripts (to a greater or lesser extent) are altogether absent, and the tables are incomplete in the other two. It is therefore impossible to know the extent to which Book II as it is represented in modern editions and translations, based heavily on the g-class manuscripts, preserves Ptolemy's original design.[178]

The first chapter of Book II is intended to demonstrate that some of the divisions of the tetrachord set forth in the previous book on the logical grounds of superparticular ratios can also be determined aurally. The demonstrations are not, however, the series of maneuvers on the canon that might be expected in order to produce the precise location of each pitch in the various tetrachordal genera. Rather, they are based on axiomatic assumptions about the sizes of intervals in some of the tunings mentioned in passing in chapter 16 of Book I. Through a process of comparing tetrachords to these axiomatic tunings, Ptolemy suggests that one might thereby deduce the size of some of the intervals.

The first pattern, ranging from the nete to the paramese of the so-called modes,[179] is simply defined as representing the intense chromatic. This pattern is replicated with the lowest pitch of a second tetrachord in unison with the paranete of the first. Through a comparison of the two tetrachords, it can be demonstrated that the single upper interval of the intense chromatic, 7:6, is indeed larger than the remaining interval of the pycnon, 8:7, because the pitch of the nete in the first tetrachord is higher than the pitch of the paranete in the second tetrachord. With the same initial tetrachord as before, a third tetrachord is then defined, ranging from the paramese to the parhypate, the mese and lichanos in unison respectively with the paranete and paramese of the first. Thus, the paramese of this new tetrachord must, by definition, be a 9:8 whole-tone higher than the mese; the interval between the lichanos and the mese must be equal to the pycnon of the first, i.e., 8:7; and the interval between the lichanos and the parhypate makes up the remainder of the fourth in the ratio 28:27. The pattern of this third tetrachord therefore represents the whole-tone diatonic genus.[180]

---

[178] Barker (*Greek Musical Writings*, 2:346, n. 119) is wrong in stating that the bulk of "the chapter (though not the tables) was missing from the texts on which the scholars and copyists who transmitted all existing MSS relied." He would seem to be following Düring (*Harmonielehre*, lxxii) in the observation that the tables in chapter 14 are present in the manuscripts, but Düring is incorrect on this point and in any case certainly does not extend it to bear on "all existing MSS." See pp. 431–33 *supra*.

[179] τῶν καλουμένων τρόπον (Düring 42.12). Later, in chapter 16 of Book II, Ptolemy returns to the various tunings he mentioned in chapter 16 of Book I, and one of these is called "the modes" (οἱ τρόποι), which does in fact exhibit an upper tetrachord in the intense chromatic genus. It is not certain whether this should be associated—here or in chapter 16—with the "modal" (τροπικά) tuning described in Book I. The scholiasts were also uncertain of the meaning at this point; one of them explains the phrase as meaning that this tetrachord turns back and forth between the diezeugmenon and the synemmenon (cf. Düring 42). This may very well be correct; see n. 181 *infra*.

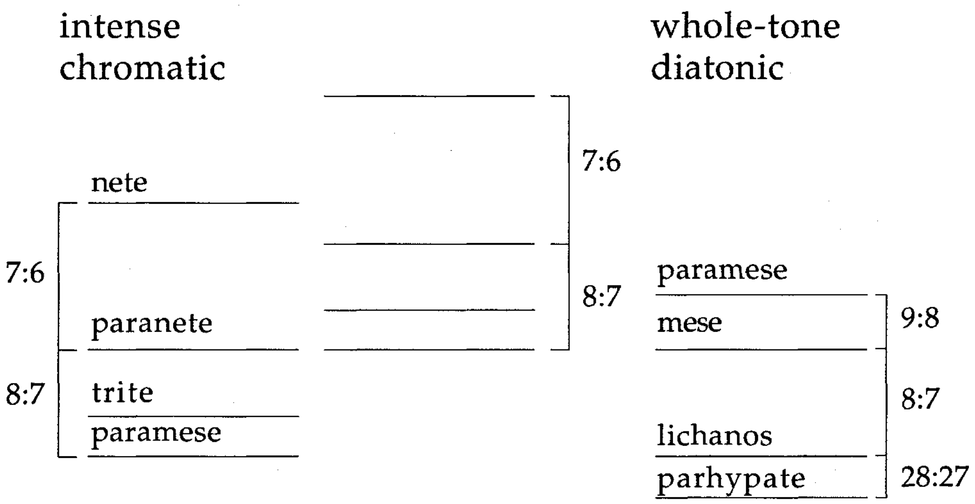


Figure 67.

Now Ptolemy proposes a new tetrachord, ranging from the trite to the lichanos of the so-called Iastiaeolian,[181] which he concedes was customarily tuned in the classic pattern of two 9:8 tones and the leimma, or in other words, in his ditonal diatonic genus. In chapter 16 of Book I, Ptolemy had observed in passing that the modulatory tunings should make use of the whole-tone diatonic and intense diatonic genera; consequently, he now proposes that "we should hold to the precise character rather than to ease of modulation"[182] and make the leimma slightly larger and the upper interval slightly smaller, thereby producing the pattern of the intense diatonic, 10:9, 9:8, 16:15. All this notwithstanding, he reverts to the original ditonal diatonic tetrachord and compares it to the tetrachord ranging from the mese to the hypate in the "parhypate tuning," which by the definitions of chapter 16 in Books I and II will represent the mild diatonic genus, 8:7, 10:9, 21:20. Finally, the mild diatonic tetrachord is compared to a tetrachord of the intense chromatic genus, 7:6, 12:11, 22:21. In each case, the sizes of the intervals are deduced by noting that certain pitches are higher or lower than the model tetrachord and then presuming the ratios to accord with those already defined in logical terms for each genus.

---

[180] In the figures that accompany this chapter in some of the manuscripts, a series of numbers is provided to demonstrate the ratios, in addition to the letter- and note-names applied to some of the strings in the text itself (see Düring 42.1–43.18). In the interest of clarifying the demonstrations, I have omitted some of this material.

Barker (*Greek Musical Writings*, 2:317, n. 9) states that the lowest note of the third tetrachord, a note Ptolemy simply calls "chromatic in the hard tuning," is the chromatic lichanos meson. If one thinks of these notes in terms of fixed pitches, it might indeed fall on a pitch that in other contexts would be in unison with the chromatic lichanos, but as it forms the fourth note of a tetrachord with the paramese, it must be the parhypate in terms of function or position. In fact, this very pattern appears in the modal, trite, and hypermodal tunings described by Ptolemy (see figure 75 [p. 475 *infra*]).

[181] τῶν καλουμένων ἰαστιαιολίων (Düring 43.19). This is among the modulatory tunings defined in Book II, chapter 16, and is probably the same as the Iastian mentioned among the tunings in chapter 16 of Book I. The tetrachord Ptolemy

No actual demonstration of the ratios is provided because Ptolemy takes the tunings as axiomatic phenomena. Since his method requires that sense and reason accord with one another, it only needs to be shown by comparing tetrachords that the senses do indeed detect various pitches in the genera as higher or lower in respect to one another. If they are, they confirm the size of the intervals determined by reason. It is important to reiterate at this point that in his logically constructed patterns and demonstrations based on contemporary practices of tuning, Ptolemy is not

---

posits (9:8, 9:8, 256:243) would indeed fit a modulation between the Iastian and Aeolian tonoi. The trite diezeugmenon in Aeolian tonos (e' in the conventional pitching) is equivalent to the nete synemmenon in Iastian; a whole-tone lower is the Iastian paranete synemmenon (d'), and a whole-tone lower than that is the Iastian trite synemmenon (c'); descending by the final interval, the leimma, brings the sequence to the Iastian mese and the Aeolian diatonic lichanos meson (b). In a real sense, the pattern is indeed "Iastiaeolian" because it can proceed in either tonos. Ptolemy will later introduce his thetic and dynamic nomenclature as a means of naming the notes, especially in an ambiguous tetrachord such as this. Here, the nomenclature must be thetic Aeolian, but the sequence of intervals is dynamic Iastian.

[182] Ἐὰν μέντοι τοῦ ἀκριβοῦς ἤθους ἐχόμενοι καὶ μὴ τοῦ προχείρου τῆς μεταβολῆς ποιῶμεν (Düring 44.6–7).

providing a historical consideration of the ancient Greek genera but rather his own ideal system. This is clearly true as well for the balance of the material presented in Book II.

In chapters 2, 12, and 13, Ptolemy returns to the subject of the canon, a subject he had already treated to some extent in chapters 2 and 8 of Book I. His purpose in the earlier treatment was twofold: first, to identify the canon as an instrument capable of providing an accurate measure of various musical ratios, and then to make use of it as part of his demonstration of the inadequacy of the Pythagorean tradition of harmonics. In Book II, on the other hand, Ptolemy wants to provide a whole series of numbers producing—as the titles of chapters 14 and 15 state—"the division of the octave in ... each of the genera" and "the divisions of the customary genera in the seven tonoi." These numbers can only be determined on some sort of harmonic canon, and Ptolemy's purpose here would seem to be a consideration of a few types of canons and their inherent deficiencies. This will allow him to propose his own alternative.

The first canon, which Ptolemy identifies as a "helicon," is also described by Aristides Quintilianus in *De musica* 3.3. Neither theorist regards it as his own invention, and it no doubt derives from a simple geometric model widely used to demonstrate the basic Pythagorean harmonia.[183]

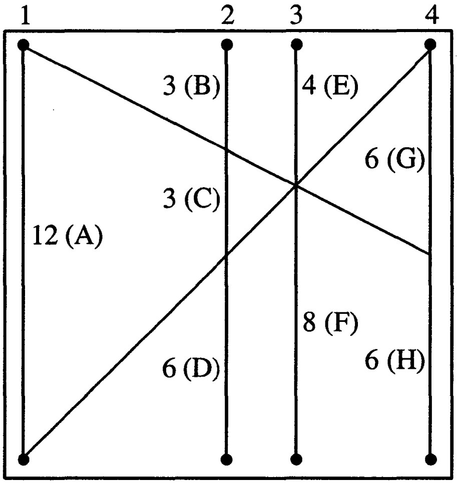


Figure 68.

---

[183] See pp. 363, 399, and 411 *supra*. Porphyrius *In Ptol. Harm.* 2.2 (Düring 157.15–16) says that the instrument was named for Mt. Helicon, the hill in Boeotia that was the seat of the Muses.

The model is particularly appealing in that it does not require any complex measurements: all the consonances as well as the whole-tone can be produced by the simple processes of constructing a square, dividing lines in half, and extending lines from one point to another. If the vertical lines are assumed to be strings, string 2 is exactly halfway between strings 1 and 4, the diagonal extending from the top of string 1 exactly bisects string 4, and string 3 is placed parallel to strings 2 and 4 exactly at the point where the two diagonals cross. If bridges are placed at the points where the diagonals cross the strings, strings 1 and 4 exhibit the ratio of 2:1 (A:H); strings 2 and 3 the ratios of 4:3 (E:B), 2:1 (D:C or F:E), 3:2 (D:E), and 9:8 (CD:F); strings 3 and 4 the ratios of 4:3 (F:H) and 3:2 (G:E); and other combinations of strings exhibit such additional ratios as 3:1 (A:E), 8:3 (F:B), and 4:1 (A:B).

By extending the diagonal that began at the top of string 1 to a point in line with the bottom of string 4, Ptolemy proposes a version of the helicon in which the diagonal becomes a pivoted bridge. As the bridge is moved downwards, the overall pitches of the four strings will rise but the ratios of the new segments one to another will remain the same, thus demonstrating the effective shift from one tonos to another.

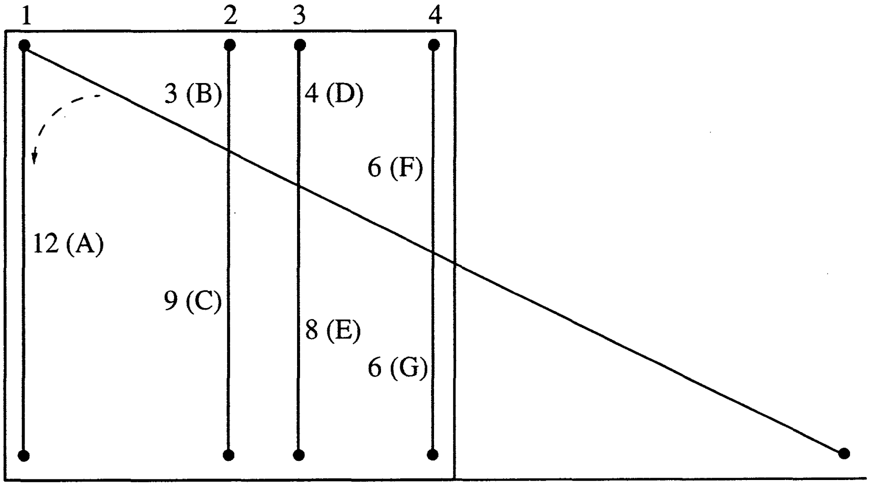


Figure 69.

For purposes of demonstrating actual genera in the various tonoi, Ptolemy regards both versions of the helicon as defective. In the traditional version, it is necessary to move individual bridges on each string to create the specific intervals in every genus and every tonos. His modified version is not much better, he concedes, because in this version, the strings themselves have to be moved to different positions in each genus in order for them to sound the proper pitches as stopped by the single pivoted bridge. Once the genus has been tuned, however, it can be transposed to other tonoi simply by pivoting the bridge.[184]

In chapters 12 and 13, Ptolemy reverts to the single-string canon, or monochord—earlier described in chapter 8 of Book I—, in order to dismiss it and instruments such as the lyre, kithara, aulos, and syrinx as wholly inadequate to measure and sound the complex divisions to be set out in chapters 14 and 15. Ptolemy regards the monochord as an instrument actually used in performance as well as in the measurement of intervals, and his assessment of its deficiences would seem to be based as much on its relative musical clumsiness as on the obvious difficulty of sounding multiple specific pitches simultaneously on a single string. In chapter 13, he describes the attempts of Didymus the musician[185] to resolve some of these difficulties by positioning the bridge so that both sides of the string would sound usable notes. For example, if the string were divided into three equal parts and the bridge were placed at one of these positions, one side of the string would form the ratio of 2:3 with respect to the entire string, while the other side of the string would form the ratio of 1:3 with respect to the entire string and 1:2 with respect to the first side; thus, the intervals of a fifth, an octave, and an octave-and-a-fifth could all be sounded from a single position of the bridge. While Ptolemy acknowledges that this may be useful for demonstrating certain stationary notes or basic Pythagorean ratios, it is of no use in constructing the various smaller intervals in which he is interested.

Still, Didymus's method did allow him to construct divisions for the chromatic and diatonic genera,[186] and there was certainly more to it than is conveyed by Ptolemy's brief description. According to Ptolemy, Didymus's chromatic, comprised of the pattern 6:5, 25:24, and 16:15, was "not at all musical" (μηδαμῶς ἐμμελοῦς) because the middle interval is smaller than the bottom interval, and in his diatonic, comprised of the pattern 9:8, 10:9, and 16:15, the middle interval should be larger than the interval at the top—as Ptolemy arranges it in his own intense diatonic. In addition, according to Ptolemy, the bottom intervals of both genera should not be the same size; the bottom interval of the diatonic should be smaller (though in Ptolemy's own divisions, this is not always the case). These are the same sorts of objections Ptolemy raised against the divisions of Archytas in chapter 13 of Book I.[187]

---

[184] Further detail on the precise means by which the strings can be positioned and sounded is deferred until the end of chapter 16, at which point Ptolemy can make use of the measurements of chapter 15. For a fuller discussion of the helicon, see Barbera, "Pythagorean Mathematics," 336-41.

[185] Probably the same Didymus quoted by Porphyrius in his commentary on chapter 2 of Book I and possibly the grammarian and musician named Didymus who lived at the time of Nero (37–68 C.E.), according to the *Suda*.

[186] And perhaps for the enharmonic genus, which is shown in one of the tables in chapter 14. Nevertheless, Ptolemy explicitly states in chapter 13 that Didymus did not make a division for the enharmonic genus, and it is important to keep in mind that the tables in chapter 14 do not exist in the earliest manu-

Ptolemy believes that Didymus and other earlier theorists were misled in their divisions because they relied on the monochord. He insists, rather, that only on an instrument of eight strings tuned to equal pitch can the various divisions be properly constructed, and with this assertion, he prepares the ground for the tables of chapters 14–15 and the introduction to them that forms the last part of chapter 13.

While the tables of chapter 14 primarily demonstrate the sorts of divisions Ptolemy has been describing, those of chapter 15 relate to Ptolemy's special theory of the tonoi, developed in chapters 3–11. It is therefore necessary to return now to these earlier chapters before considering the tables themselves.

Ptolemy bases his restructuring of the tonoi on the earlier theory of the species of the octave, and he begins by providing a simple summary of the three species of the fourth, the four species of the fifth, and the seven species of the octave. Although the means he chooses to demonstrate the species differ somewhat from those of his predecessors, the species themselves are exactly as Cleonides demonstrated them in section IX of his treatise; Ptolemy does not, however, apply the ethnic names to the species of the octave until chapter 11.[188] The three basic consonances may be combined to form scales, the subject of chapter 4, but for Ptolemy, the only perfect scale is one that contains all the species of the basic consonances. Thus, the octave is not a perfect scale,

---

scripts. Didymus's enharmonic division as it now appears in the tables could very well have been a later reconstruction (see pp. 431–33 *supra*).

[187] See pp. 446–47 *supra*.

[188] See pp. 379–81 *supra*.

even though it was considered so by "the ancients" (οἱ παλαιοί). Likewise, since the octave-and-a-fourth cannot contain all the species of the octave and might not even contain all the species of the fifth, it too cannot be considered a perfect scale. Ptolemy does not actually refer to this scale as the Lesser Perfect System, but he clearly has it in mind here. The double octave, however, can accommodate all species of the fourth, fifth and octave, and it alone is therefore a true perfect scale.

These definitions certainly differ from those of any earlier theorist. While Aristoxenus does allude to a perfect scale (*De principiis* II/M), it is never defined in the surviving sections of the *Harmonica* and he never discusses the Greater and Lesser Perfect Systems as such. Cleonides, on the other hand, specifically refers to the Greater and Lesser Perfect Systems in his *Harmonica introductio*. Once again, it would seem that Ptolemy relied on later Aristoxenian treatises for his sense of the earlier tradition.

In chapter 5, Ptolemy introduces the special nomenclature that will be necessary for the formulation of his theory of tonoi in chapters 8–11. He proposes that the traditional names of the fifteen notes of the double octave, proslambanomenos through nete hyperbolaion, should actually be understood in two ways: by position (θέσις) and by function (δύναμις)—in other words, a "thetic" and "dynamic" nomenclature.[189] When understood by position, that is, in thetic terms, the name of a note simply indicates its place within the series: in respect to the hypate meson, for example, the mese will be three notes higher and the hypate hypaton will be three notes lower. Named by position, the notes indicate nothing about their overall pitch or the size of the interval from one to the next. But when understood by function, that is, in dynamic terms, the name of a note indicates its relationship to a specific sequence of intervals typical of any one of the genera. In this respect, the mese and the paramese, for example, will be the lower and upper notes bounding the tone of disjunction; in one of the diatonic genera, the hypate meson and the lichanos hypaton will bound the interval of a tone, while the hypate meson and parhypate meson define some kind of semitone (the precise size of the interval always depending on the tuning of the particular genus); and so on. Ptolemy then uses this nomenclature to identify the seven species of the octave, precisely as Cleonides had defined them, but still without the ethnic names.[190]

---

[189] See, for example, Reinhold Issberner, "Dynamis und Thesis," *Philologus* 55 (1896): 541–60; Reginald P. Winnington-Ingram, *Mode in Ancient Greek Music* (Cambridge: Cambridge University Press, 1936; reprint, Amsterdam: Hakkert, 1968), 63–65; and then later Reese, *Music in the Middle Ages*, 39–41; Henderson, "Ancient Greek Music," 353–58; West, *Ancient Greek Music*, 221; etc.

While this type of nomenclature may seem unwieldy in comparison to a system based on fixed pitches, it actually provides a relatively effective means of describing a series of notes and intervals that can be established at any pitch and in any particular tuning. The two nomenclatures are envisioned as parallel patterns that may be aligned at any point to produce a particular sequence of intervals (represented by the dynamic nomenclature) against a stable sequence of available notes (represented by the thetic nomenclature).[191] In chapter 11, Ptolemy will define these alignments as a series of seven possible tonoi, finally employing the ethnic names associated with the seven octave species by Cleonides. Three of these tonoi are shown in figure 70 as an example of the way in which the dynamic sequence of intervals is superimposed upon the thetic sequence of notes, which always remains the same (the full set of tonoi appears in figure 71).

There is no evidence prior to Ptolemy's *Harmonica* of this type of parallel nomenclature, but earlier theorists do pay considerable attention to the function of the individual notes. For Aristoxenus, function is one of the most important criteria for comprehending any musical phenomenon. Likewise, both speakers in the Plutarchean *De musica* recognize the defining function of the tone of disjunction when they describe the effect of the spondeiasmos.[192] Cleonides, however, provides the most straightforward definition at the very end of his *Harmonica introductio*: "Function is the order of the note in the scale; or, function is the order of the note, through which we recognize each of the notes." Earlier, in section VIII of the treatise, he had given particular importance to the mese, remarking that it determines the functions of all the rest of the notes.[193] Here again, Ptolemy seems to be taking Cleonides—or some common tradition—as his point of departure in developing the parallel nomenclatures as part of his restructuring of the theory of the tonoi within a single characteristic octave.

---

[190] See pp. 379–81 *supra.*

[191] In fact, Ptolemy has already demonstrated the process in chapter 1 of Book II when describing the tetrachord of the Iastiaeolian, but without employing his new nomenclature. See nn. 180–81 *supra.* This system is quite similar to the later medieval system of hexachords (which are dynamic) superimposed on the system of letters (which are thetic). The letter C, for example, might be dynamically construed as ut, fa, or sol; or with the introduction of the *conjunctae,* even as mi or la. For a description of the *conjunctae,* see *The Berkeley Manuscript,* ed. and trans. Oliver B. Ellsworth, Greek and Latin Music Theory, vol. 2 (Lincoln: University of Nebraska Press, 1984), 53–67.

[192] See especially pp. 322, 330–31, and 357–61 *supra.*

hypate meson		parhypate meson		lichanos meson		mese		paramese		trite diezeugmenon		paranete diezeugmenon		nete diezeugmenon	thetic nomenclature
hypate meson	ST	parhypate meson	T	lichanos meson	T	mese	TD	paramese	ST	trite diezeugmenon	T	paranete diezeugmenon	T	nete diezeugmenon	dynamic nomenclature (Dorian tonos)
lichanos hypaton	T	hypate meson	ST	parhypate meson	T	lichanos meson	T	mese	TD	paramese	ST	trite diezeugmenon	T	paranete diezeugmenon	dynamic nomenclature (Phrygian tonos)
hypate hypaton	ST	parhypate hypaton	T	lichanos hypaton	T	hypate meson	ST	parhypate meson	T	lichanos meson	T	mese	TD	paramese	dynamic nomenclature (Mixolydian tonos)

ST = semitone; T = tone; TD = tone of disjunction

Figure 70.

---

[193] See pp. 382–84 *supra*.

Ptolemy recognizes of course that his listing of the names of the notes in chapter 5 omits those of the synemmenon tetrachord, the tetrachord used in the Lesser Perfect System of an octave-and-a-fourth, traditionally accepted as a part of the theoretical system. In order to bolster his premise that only the double octave is perfect, he sets out in chapter 6 to show why the synemmenon tetrachord—and concomitantly a separate conjunct scale based on the octave-and-a-fourth—is unnecessary. The argument is simple: (1) the conjunct scale was used by the ancients to modulate from one tonos to another; (2) if a modulation of the tonos a fourth higher or lower is assumed, it provides an additional tetrachord identical to the synemmenon; (3) the same effect can thereby be achieved; and (4) the conjunct scale is therefore redundant. Ptolemy adds that the ancients knew only the Dorian, Phrygian, and Lydian tonoi, separated one from another by a whole-tone. Since they accordingly could not modulate to a tonos a fourth higher or lower, they adopted the conjunct system to create the same effect. Elsewhere in chapters 6 and 7, however, he observes that the pitch of the tonoi can in theory be shifted up or down infinitely.

The argument is not very convincing. In the first place, Ptolemy never identifies "the ancients"; indeed, they are mentioned only here and in chapter 4. Most—if not all—of Ptolemy's earlier demonstrations have been based on the traditions of the Aristoxenians and Pythagoreans, but far more than three tonoi are already well attested by the sixth century B.C.E.,[194] long before the development of any theoretical Greater and Lesser Perfect Systems, which form the crux of the argument. Finally, while the synemmenon tetrachord was certainly used in modulations,[195] there is no evidence in the treatises or the musical fragments to suggest that these represent a conceptual modulation of the tonos up or down a fourth.[196] But Ptolemy's argument is, of course, not fundamentally historical; his concern is to reduce the theory to its simplest and, for him, most rational form.

---

[194] These three tonoi certainly occupied primary positions, however, as is attested by descriptions of the Trimere Nomos (see pp. 64–65 *supra*) and the dithyrambs of the school of Timotheus and Philoxenus (see p. 80 *supra*), and by Aristides Quintilianus *De musica* 1.11 (see p. 534 *infra*), which considers the Dorian, Phrygian, and Lydian tonoi as three basic types (all the others hypertonoi, hypotonoi, or mixed tonoi).

[195] See n. 181 *supra* for an example of the process.

[196] See, for example, pp. 115 and 387–88 *supra*.

In chapters 7–11, Ptolemy finally establishes his new theory of the tonoi. First, he acknowledges that the term "tonos" has been applied to shifts of the entire series of notes to a higher or lower pitch, observing as well that the number of tonoi, though conceptually infinite, is limited by three defining characteristics: the interval between the lowest and highest actual tonos, the number of tonoi that can be placed between the extremes, and the interval between the tonoi. According to Ptolemy, some earlier writers proposed that the interval between the lowest and highest tonos was an octave, while others thought it was smaller or larger; some proposed that the tonoi should be separated by semitones, while others identified different intervals. In fact, this general definition of tonos accords quite well with Cleonides's description of thirteen tonoi spanning the interval of an octave and separated by semitones, an arrangement he attributes to Aristoxenus.[197] Ptolemy, however, rejects this usage. Tonos is, rather, a distribution of pitches within a hypothetical range—a "characteristic octave," as will later become clear—enabling any melos to be sung within that range.[198]

With this new definition of tonos, Ptolemy observes that since the octave represents the interval from which all successive intervals are simply functional replications of previous intervals,[199] now compounded with the octave, there is no point in extending the tonoi beyond the octave; these would simply be redundant. Because there are only seven species of the octave, there only need be seven tonoi. Three of the seven should be the Dorian, Phrygian, and Lydian, which Ptolemy associated in chapter 6 with "the ancients"; they are assumed to be separated one from another by a tone. The fourth tonos is then determined by making the "first consonant modulation" (πρώτην μεταβολὴν σύμφωνον) a fourth above the Dorian; this tonos is called the Mixolydian because of its proximity to the Lydian. The remaining three tonoi—Hypodorian, Hypophrygian, and Hypolydian—are formed by modulating a fourth below their respective primary tonoi. If a redundant eighth tonos were added an octave above the Hypodorian, it would be called the Hypermixolydian.

---

[197] The attribution to Aristoxenus, however, is most probably erroneous (see pp. 385–87 *supra*). Aristoxenus describes some of the arrangements of tonoi proposed by the Harmonicists, which he dismisses as useless (see pp. 322–23 *supra*).

[198] Ptolemy's two conceptions of tonos are somewhat similar to the modern musical distinctions between transposition and modulation. For example, a melody in C major confined to the single octave c'-c" transposed up a fifth to G major (assuming equal temperament), apart from sounding higher and perhaps brighter, would retain exactly the same countour and sequence of intervals, but within the octave g'-g". On the other hand, a melody within the single octave c'-c" that modulated from C major to G major would require—or at least imply—the alteration of f' to f♯' and the corresponding "functions" of each scale degree. These alterations can be easily seen in figure 71 (p. 465 *infra*).

[199] As he proposed in Book I, chapter 6.

It is certainly no coincidence that the names of these seven tonoi are equivalent to the ethnic names applied to the species of the octave by Cleonides, and Ptolemy himself finally associates the names of the seven tonoi with the species of the octave. In fact, his tonoi are simply redistributions of these species within the characteristic octave.

Ptolemy has now satisfied the first two defining characteristics: the interval between the lowest and highest tonos and the number of tonoi between the extremes. To demonstrate the third characteristic, the intervals between these new tonoi, Ptolemy begins with the highest tonos (excluding the redundant Hypermixolydian), the Mixolydian, and then by tuning up and down by fourths and fifths,[200] he locates in order the Dorian, Hypodorian, Phrygian, Hypophrygian, Lydian, and Hypolydian, each of which is distributed within the central characteristic octave bounded by thetic hypate meson and nete diezeugmenon. Figure 71 illustrates the resulting arrangement, notated with the conventional pitching.

When the tonoi are distributed in this way, the intervals between them must be construed in terms of some constant note, such as dynamic mese. In that case, it is then clear that two pairs of tonoi—Mixolydian and Lydian, Dorian and Hypolydian—are separated by a semitone and all the others are separated by a tone.

---

[200] Ptolemy had previously demonstrated that these produced functionally equivalent notes within an octave: that is, tuning up a fourth or a fifth from the lower pitch of an octave will produce the same pitch as tuning down a fifth or a fourth from the upper pitch of an octave.

	Mixolydian	Lydian	Phrygian	Dorian	Hypolydian	Hypophrygian	Hypodorian
thetic	dynamic						
nd	e'' (pm)	e'' (td)	e'' (pnd)	e'' (nd)	e'' (th)	e'' (pnh)	e'' (nh)
pnd	d'' (m)	d♯'' (pm)	d'' (td)	d'' (pnd)	d♯'' (nd)	d'' (th)	d'' (pnh)
td	c'' (lm)	c♯'' (m)	c♯'' (pm)	c'' (td)	c♯'' (pnd)	c♯'' (nd)	c'' (th)
pm	b♭' (phm)	b' (lm)	b' (m)	b' (pm)	b' (td)	b' (pnd)	b' (nd)
m	a' (hm)	a' (phm)	a' (lm)	a' (m)	a♯' (pm)	a' (td)	a' (pnd)
lm	g' (lh)	g♯' (hm)	g' (phm)	g' (lm)	g♯' (m)	g♯' (pm)	g' (td)
phm	f' (phh)	f♯' (lh)	f♯' (hm)	f' (phm)	f♯' (lm)	f♯' (m)	f♯' (pm)
hm	e' (hh)	e' (phh)	e' (lh)	e' (hm)	e' (phm)	e' (lm)	e' (m)

Abbreviations for the names of notes:
proslambanomenos (=pl)
hypate hypaton (=hh)
parhypate hypaton (=phh)
lichanos hypaton (=lh)
hypate meson (=hm)
parhypate meson (=phm)
lichanos meson (=lm)
mese (=m)
paramese (=pm)
trite diezeugmenon (=td)
paranete diezeugmenon (=pnd)
nete diezeugmenon (=nd)
trite hyperbolaion (=th)
paranete hyperbolaion (=pnh)
nete hyperbolaion (=nh)

Figure 71.

While Ptolemy's approach does have some appeal as a logical system, it is unlikely that it represents either a historical view of the tonoi or a description of contemporary practice. Many centuries earlier, Aristoxenus had specifically repudiated such figures as Eratocles and the followers of Pythagoras of Zacynthos and Agenor of Mytilene for limiting their view to a mechanical manipulation of the seven octave species or other intervallic patterns—a method certainly similar to Ptolemy's—and the Harmonicists in general for their discussion of the tonoi and for basing their theory on a single genus in the range of an octave, which they had represented in a series of diagrams.[201] Moreover, even the musical fragments dated to a period more or less contemporary with Ptolemy tend to exhibit a much wider range of tonoi and distribution of relative pitch than Ptolemy's characteristic octave would suggest. His system did, however, have a profound impact on later theorists.[202]

At the end of chapter 13, Ptolemy proposed that the various divisions of the genera—and, by extension, the tonoi—could only be properly demonstrated on a canon with eight strings tuned to equal pitch, and he promised to present a series of tables providing the canonic measurements, worked out to the sixtieth part of the basic unit of measure. Taking Aristoxenus's division of the fourth into thirty parts, Ptolemy divided the octave itself into sixty parts, with 60 and 120 as the extreme numbers. From these were calculated the points bounding the tone of disjunction, that is, 90 and 80. The intermediate notes were then calculated on the basis of the ratios in each genus.

The tables themselves appear in chapter 14 after a short introduction listing the ratios for each division of the enharmonic genus (or parts in the case of Aristoxenus's division), but the extent to which they actually present Ptolemy's intentions cannot be known. As already noted, they are altogether absent in the earliest manuscripts and exist for the most part in various incomplete states in later manuscripts. The form in which they have come to be known in modern editions and translations is almost certainly a reconstruction by Nicephorus Gregoras and Isaac Argyros. This would not have been extremely difficult to do; with the exception of the chromatic and diatonic divisions of Eratosthenes,[203] all the divisions had either been described prior to chapter 14 or presented in its brief introduction.

---

[201] See pp. 301, 309–10, 322–23, and 333–34 *supra.*

[202] Especially Boethius, Byzantine theorists such as Pachymeres and Bryennius, and a number of Renaissance theorists such as Johannes Gallicus, Franchino Gaffurio, Francisco de Salinas, Henry Glarean, and others. See Claude V. Palisca, *Humanism in Italian Renaissance Musical Thought* (New Haven, Conn.: Yale University Press, 1985), chapter 11 ("Greek Tonality and Western Modality").

[203] The divisions of Eratosthenes are probably not historically accurate. See Paul Tannery, "Sur les intervalles de la musique grecque," *Revue des études grecques* 15 (1902): 336–52; but also André Barbera, "Arithmetric and Geometric Divisions of the Tetrachord," *Journal of Music Theory* 21 (1977): 294–323.

In the following three tables (figures 72–74), based on those of chapter 14, each of the genera is attributed to a particular figure: Archytas, Aristoxenus, Eratosthenes, Didymus, and Ptolemy himself. Under the heading for each figure, the appropriate canonic measurements, as given in Ptolemy's—or his Byzantine redactors'—sexigesimal fractions, are shown in the left column, under the heading "length." The center column shows the ratios of the intervals or, in the case of Aristoxenus's divisions, the parts.[204] The right column adds an equivalent representation of the intervals in cycles per second, with the 9:8 ratio in the center of each octave taken as representing the tone of disjunction formed by the mese and paramese, the mese pitched at a' 440.[205]

---

[204] In the manuscripts, the ratios or Aristoxenian parts are normally not distributed among the canonic measurements but rather are simply listed at the bottom of each column. The Aristoxenian parts have been distributed here only among the measurements of the lower tetrachord because it is only in that tetrachord where they represent the numerical difference between the canonic numbers. In fact, however, the Aristoxenian parts cannot be accurately represented in this system of string lengths, although the intervals that result are close to those described by Aristoxenus. In any event, the tables misrepresent Aristoxenus's divisions: he himself never projected them onto the octave (see pp. 333–34 *supra*).

[205] As always, this pitching is purely conventional. There have been numerous studies of these scales, where the intervals are most often given in cents (among others, see, R. P. Winnington-Ingram, "Aristoxenus and the Intervals of Greek Music" *Classical Quarterly* 26 [1932]: 195–208; and Barbera, "Arithmetric and Geometric Divisions"). I have opted, however, to show the pitches in cps because this makes it much easier for a musician to visualize the relative position of each pitch in the octave (or to tune the pitches on an electronic or conventional keyboard). The calculations are derived from Malcolm Litchfield, "Ancient Greek Tunings in Cycles per Second," unpublished document for a recording of each of these scales on a synthesizer. With the exception of the Aristoxenian tunings, the movable notes within the tetrachords were calculated on the basis of the intervallic ratios, not the string lengths; the Aristoxenian tunings were calculated on a constant based on the thirtieth root of the ratio 4:3. All cps are rounded off to the first decimal place.

In somewhat different form, the Ptolemaic tables also appear in Düring, *Harmonielehre*, 70–73; idem, *Ptolemaios*, 86–88; and Barker, *Greek Musical Writings*, 2:347–50. It is unfortunate that in the published translations, exact fractions are given, based on a calculation of the ratios in the various divisions. While these fractions in some cases represent the specific ratio more accurately than the sexagesimal forms, they misrepresent the practical purpose of the numbers, which is to identify specific points along a constant measure where the strings are actually to be stopped by the bridges.

Enharmonic genus

<table>
<tr><th colspan="2">Archytas</th><th colspan="2">Aristoxenus</th><th colspan="2">Eratosthenes</th><th colspan="2">Didymus</th><th colspan="2">Ptolemy</th></tr>
<tr><th>length</th><th>cps</th><th>length</th><th>cps</th><th>length</th><th>cps</th><th>length</th><th>cps</th><th>length</th><th>cps</th></tr>
<tr><td>60</td><td>660</td><td>60</td><td>660</td><td>60</td><td>660</td><td>60</td><td>660</td><td>60</td><td>660</td></tr>
<tr><td colspan="2">5:4</td><td colspan="2"></td><td colspan="2">19:15</td><td colspan="2">5:4</td><td colspan="2">5:4</td></tr>
<tr><td>75</td><td>528</td><td>76</td><td>524.3</td><td>76</td><td>521.1</td><td>75</td><td>528</td><td>75</td><td>528</td></tr>
<tr><td colspan="2">36:35</td><td colspan="2"></td><td colspan="2">39:38</td><td colspan="2">31:30</td><td colspan="2">24:23</td></tr>
<tr><td>$77^{9}/_{60}$</td><td>513.3</td><td>78</td><td>509.4</td><td>78</td><td>507.7</td><td>$77^{30}/_{60}$</td><td>510.9</td><td>$78^{16}/_{60}$</td><td>506</td></tr>
<tr><td colspan="2">28:27</td><td colspan="2"></td><td colspan="2">40:39</td><td colspan="2">32:31</td><td colspan="2">46:45</td></tr>
<tr><td>80</td><td>495</td><td>80</td><td>495</td><td>80</td><td>495</td><td>80</td><td>495</td><td>80</td><td>495</td></tr>
<tr><td colspan="2">9:8</td><td colspan="2">9:8</td><td colspan="2">9:8</td><td colspan="2">9:8</td><td colspan="2">9:8</td></tr>
<tr><td>90</td><td>440</td><td>90</td><td>440</td><td>90</td><td>440</td><td>90</td><td>440</td><td>90</td><td>440</td></tr>
<tr><td colspan="2">5:4</td><td colspan="2">24</td><td colspan="2">19:15</td><td colspan="2">5:4</td><td colspan="2">5:4</td></tr>
<tr><td>$112^{30}/_{60}$</td><td>352</td><td>114</td><td>349.5</td><td>114</td><td>347.4</td><td>$112^{30}/_{60}$</td><td>352</td><td>$112^{30}/_{60}$</td><td>352</td></tr>
<tr><td colspan="2">36:35</td><td colspan="2">3</td><td colspan="2">39:38</td><td colspan="2">31:30</td><td colspan="2">24:23</td></tr>
<tr><td>$115^{43}/_{60}$</td><td>342.2</td><td>117</td><td>339.6</td><td>117</td><td>338.5</td><td>$116^{15}/_{60}$</td><td>340.6</td><td>$117^{23}/_{60}$</td><td>337.3</td></tr>
<tr><td colspan="2">28:27</td><td colspan="2">3</td><td colspan="2">40:39</td><td colspan="2">32:31</td><td colspan="2">46:45</td></tr>
<tr><td>120</td><td>330</td><td>120</td><td>330</td><td>120</td><td>330</td><td>120</td><td>330</td><td>120</td><td>330</td></tr>
</table>

Figure 72.

Figure 73.

Archytas

length		cps
60		660
	32:27	
$71\,^{7}/_{60}$		556.9
	243:224	
$77\,^{9}/_{60}$		513.3
	28:27	
80		495
	9:8	
90		440
	32:27	
$106\,^{40}/_{60}$		371.3
	243:224	
$115\,^{43}/_{60}$		342.2
	28:27	
120		330

Chromatic genus

Aristoxenus								
mild color			hemiolic color			whole-tone color		
length		cps	length		cps	length		cps
60		660	60		660	60		660
74 $^{40}/_{60}$		534.5	74		539.6	72		555.4
77 $^{20}/_{60}$		514.4	77		516.8	76		524.3
80		495	80		495	80		495
	9:8			9:8			9:8	
90		440	90		440	90		440
	22			21			18	
112		356.3	111		359.7	108		370.2
	4			4 $^{1}/_{2}$			6	
116		342.9	115 $^{30}/_{60}$		344.6	114		349.5
	4			4 $^{1}/_{2}$			6	
120		330	120		330	120		330

Figure 73 continued.

Eratosthenes

length		cps
60		660
	6:5	
72		550
	19:18	
76		521.1
	20:19	
80		495
	9:8	
90		440
	6:5	
108		366.7
	19:18	
114		347.4
	20:19	
120		330

Chromatic genus

Didymus		Ptolemy			
		mild color		intense color	
length	cps	length	cps	length	cps
60	660	60	660	60	660
6:5		6:5		7:6	
72	550	72	550	70	565.7
25:24		15:14		12:11	
75	528	$77\,{}^{9}/_{60}$	513.3	$76\,{}^{22}/_{60}$	518.6
16:15		28:27		22:21	
80	495	80	495	80	495
9:8		9:8		9:8	
90	440	90	440	90	440
6:5		6:5		7:6	
108	366.7	108	366.7	105	377.1
25:24		15:14		12:11	
$112\,{}^{30}/_{60}$	352	$115\,{}^{43}/_{60}$	342.2	$114\,{}^{33}/_{60}$	345.7
16:15		28:27		22:21	
120	330	120	330	120	330

Figure 74.

Diatonic genus

		Aristoxenus							
Archytas		mild diatonic		intense diatonic		Eratosthenes		Didymus	
length	cps	length	cps	length	cps	length	cps	length	cps
60	660	60	660	60	660	60	660	60	660
9:8						9:8		9:8	
$67\,^{30}/_{60}$	586.7	70	571.6	68	588.3	$67\,^{30}/_{60}$	586.7	$67\,^{30}/_{60}$	586.7
8:7						9:8		10:9	
$77\,^{9}/_{60}$	513.3	76	524.3	76	524.3	$75\,^{56}/_{60}$	521.5	75	528
28:27						256:243		16:15	
80	495	80	495	80	495	80	495	80	495
9:8		9:8		9:8		9:8		9:8	
90	440	90	440	90	440	90	440	90	440
9:8		15		12		9:8		9:8	
$101\,^{15}/_{60}$	391.1	105	381.1	102	392.2	$101\,^{15}/_{60}$	391.1	$101\,^{15}/_{60}$	391.1
8:7		9		12		9:8		10:9	
$115\,^{43}/_{60}$	342.2	114	349.5	114	349.5	$113\,^{54}/_{60}$	347.7	$112\,^{30}/_{60}$	352
28:27		6		6		256:243		16:15	
120	330	120	330	120	330	120	330	120	330

Diatonic genus

Ptolemy

mild diatonic		whole-tone diatonic		ditonal diatonic		intense diatonic		equal diatonic	
length	cps	length	cps	length	cps	length	cps	length	cps
60	660	60	660	60	660	60	660	60	660
8:7		9:8		9:8		10:9		10:9	
$68\,^{34}/_{60}$	577.5	$67\,^{30}/_{60}$	586.7	$67\,^{30}/_{60}$	586.7	$66\,^{40}/_{60}$	594	$66\,^{40}/_{60}$	594
10:9		8:7		9:8		9:8		11:10	
$76\,^{11}/_{60}$	519.8	$77\,^{9}/_{60}$	513.3	$75\,^{56}/_{60}$	521.5	75	528	$73\,^{20}/_{60}$	540
21:20		28:27		256:243		16:15		12:11	
80	495	80	495	80	495	80	495	80	495
9:8		9:8		9:8		9:8		9:8	
90	440	90	440	90	440	90	440	90	440
8:7		9:8		9:8		10:9		10:9	
$102\,^{51}/_{60}$	385	$101\,^{15}/_{60}$	391.1	$101\,^{15}/_{60}$	391.1	100	396	100	396
10:9		8:7		9:8		9:8		11:10	
$114\,^{17}/_{60}$	346.5	$115\,^{43}/_{60}$	342.2	$113\,^{54}/_{60}$	347.7	$112\,^{30}/_{60}$	352	110	360
21:20		28:27		256:243		16:15		12:11	
120	330	120	330	120	330	120	330	120	330

Figure 74 continued.

If the tables of chapter 14 are intended to represent to some extent historical tunings, those of chapter 15 represent Ptolemy's particular theory of the tonoi, each of which is now displayed in a pair of tables, the first representing the characteristic octave bounded by thetic nete diezeugmenon and hypate meson and the second representing the lower octave bounded by thetic mese and the proslambanomenos. For purposes of demonstration, the table representing the lower octave is intended to represent effectively the upper octave as well, bounded by nete hyperbolaion and mese. Moreover, with the exception of the Hypolydian tonos, each of the tables representing a tonos in the lower octave is identical to one of the tables representing a tonos in the characteristic octave because there can only be eight projections of the octave across the dynamic range from proslambanomenos to nete hyperbolaion.

Each display is further distributed across a series of five scales exhibiting the particular mixtures of the whole-tone diatonic with other genera, as Ptolemy had advocated at the end of Book I.[206] The first scale shows the mixture of the intense chromatic with the whole-tone diatonic; the second, the mild diatonic with the whole-tone diatonic; the third, the whole-tone diatonic unmixed with other genera; the fourth, the ditonal diatonic with the whole-tone diatonic; and the fifth, the intense diatonic with the whole-tone diatonic. A final table combines all the various numbers into a single grand complex, "so that both the great number of positions and the magnitude of the distance determined by each of the notes in every displayed modulation may be evident to us."[207]

Like those of chapter 14, the tables of chapter 15 are almost certainly a later reconstruction; the descriptions at the beginning of the chapter and elsewhere in Books I and II provide information sufficient to calculate all the numbers.[208] Aristoxenus would most probably have disapproved of all these tables and surely of the final table as an example of "close-packing" (καταπύκνωσις), characteristic of the Harmonicists' diagrams.[209] In any case, because they represent Ptolemy's particular arrangement of the tonoi, it is doubtful that his tables preserve any historical diagrams known to Aristoxenus; they are simply characteristic of the type.

---

[206] See pp. 450–51 *supra*.

[207] ἵνα δῆλον ἡμῖν ᾖ τό τε πλῆθος τῶν τόπων καὶ τὸ μέγεθος τῆς καταλαμβανομένης διαστάσεως ἐφ' ἑκάστου τῶν φθόγγων ἐν ἁπάσαις ταῖς ἐκκειμέναις μεταβολαῖς (Düring 75.19–22). The tables appear in all the translations (Düring, *Ptolemaios*, 91–98; and Barker, *Greek Musical Writings*, 2:352–55). Although there are a few misprints in Düring's translation, his version of the tables is still the most valuable because (following Ptolemy's own description of the tables at the beginning of chapter 15) he has added columns showing the thetic and dynamic equivalents of the numbers, which make it much easier to visualize the way in which Ptolemy's thetic and dynamic nomenclatures interact to produce the necessary intervals.

[208] As usual, Barbera ("Pythagorean Mathematics," 324–32) presents the most lucid account of the calculations required to create the tables.

Ptolemy now concludes Book II by relating the tables to the practical tunings of the lyre and the kithara, already introduced at the end of Book I. The first and third scales represent the mild and hard tunings used on the lyre, while on the kithara, the tunings are defined in terms of specific scales appearing in particular tables of the tonoi in the characteristic octave. Thus, the first scale in the table of the Hypodorian tonos represents modal tuning; the second in the Dorian, parhypate tuning; the third in the Hypodorian, trite tuning; the third in the Phrygian, hypermodal tuning; the fourth in the Hypophrygian, the modulatory Iastiaeolian; and the fourth in the Dorian, the modulatory Lydian (see figure 75).

Inasmuch as each of these tables is identical to another table representing some other tonos, it is unlikely that Ptolemy regarded these tunings as associated with particular tonoi.[210] They do, however, represent characteristic patterns that might indeed have been used in practice. For example, both modulatory tunings—and only those two tunings—exhibit an identical set of ratios, including two pairs of 9:8 whole-tones, one pair around the mese and the other placed either at the bottom (Iastiaeolian) or the top (Lydian), with all the remaining ratios distributed accordingly in the characteristic octave. These four whole-tones would make it easy for the performer to modulate up or down a whole-tone—precisely the example given by Ptolemy in the first chapter of Book II[211]—or indeed a ditone, a fourth, a fifth, or a sixth. The hypermodal tuning resembles the modulatory tunings in having a pair of 9:8 whole-tones, and its upper tetrachord is identical to the upper tetrachord of the Iastiaeolian, while its lower tetrachord is identical to the lower tetrachords of the modal and trite tunings.

---

[209] See pp. 301–2, 309, 322, 333–34, and 465–66 *supra.*

[210] Though this is proposed by Barker (*Greek Musical Writings*, 2:357–61).

[211] See pp. 452–53 *supra.*

Figure 75.

	Modal		Parhypate		Trite		Hypermodal		Modulatory (Iastiaeolian)		Modulatory (Lydian)	
thetic	length	cps	length	cps	length	cps	length	cps	length	cps	length	cps
nd	60	660	60	660	60	660	60	660	60	660	60	660
	7:6		9:8		9:8		8:7		8:7		9:8	
pnd	70	565.7	$67\ {}^{30}/_{60}$	586.7	$67\ {}^{30}/_{60}$	586.7	$68\ {}^{34}/_{60}$	577.5	$68\ {}^{34}/_{60}$	577.5	$67\ {}^{30}/_{60}$	586.7
	12:11		8:7		8:7		28:27		28:27		9:8	
td	$76\ {}^{22}/_{60}$	518.6	$77\ {}^{9}/_{60}$	513.3	$77\ {}^{9}/_{60}$	513.3	$71\ {}^{7}/_{60}$	556.9	$71\ {}^{7}/_{60}$	556.9	$75\ {}^{56}/_{60}$	521.5
	22:21		28:27		28:27		9:8		9:8		256:243	
pm	80	495	80	495	80	495	80	495	80	495	80	495
	9:8		9:8		9:8		9:8		9:8		9:8	
m	90	440	90	440	90	440	90	440	90	440	90	440
	8:7		8:7		8:7		8:7		256:243		9:8	
lm	$102\ {}^{51}/_{60}$	385	$102\ {}^{51}/_{60}$	385	$102\ {}^{51}/_{60}$	385	$102\ {}^{51}/_{60}$	385	$94\ {}^{49}/_{60}$	417.7	$101\ {}^{15}/_{60}$	391.1
	28:27		10:9		28:27		28:27		9:8		8:7	
phm	$106\ {}^{40}/_{60}$	371.3	$114\ {}^{17}/_{60}$	346.5	$106\ {}^{40}/_{60}$	371.3	$106\ {}^{40}/_{60}$	371.3	$106\ {}^{40}/_{60}$	371.3	$115\ {}^{43}/_{60}$	342.2
	9:8		21:20		9:8		9:8		9:8		28:27	
hm	120	330	120	330	120	330	120	330	120	330	120	330

Abbreviations for the names of notes:
hypate meson (=hm)
parhypate meson (=phm)
lichanos meson (=lm)
mese (=m)
paramese (=pm)
trite diezeugmenon (=td)
paranete diezeugmenon (=pnd)
nete diezeugmenon (=nd)

The hypermodal tuning could thus be used in conjunction with the Iastiaeolian, the trite, or the modal tunings for a further modulation by a fourth or fifth. Finally, the trite and parhypate tunings are identical, with the exception of the position of the thetic parhypate, and their names probably derive from the functions of the notes. The parhypate tuning falls exactly in the characteristic octave, and indeed, it is the parhypate that is distinctive; the trite tuning, on the other hand, falls exactly in the upper octave, where the tritai predominate (further relationships among the tunings can easily be observed in figure 75).

Since Ptolemy is so specific in attributing these tunings to actual practice on the lyre and kithara, and since any of these tunings could be pitched at any level, it is difficult to escape the conclusion that these may have been the "tonoi" used for all practical purposes in Ptolemy's day, his more complete and rational system notwithstanding. Moreover, while the range of difference among the various semitones (i.e., 28:27, 21:20, and 256:243) is somewhat greater, the difference among the various whole-tones (i.e., 10:9, 9:8, and 8:7) used in any of the tunings would be only ca. 7–9 cps in the upper tetrachord and ca. 4–6 cps in the lower tetrachord. In practical terms, this is negligible on instruments such as the lyre and the kithara, which could not in any case have produced or maintained exact tunings—as Ptolemy himself admits in Book II, chapter 12—because of their construction and the effect of plucking on the strings.[212] If these were the practical "tonoi" used in Ptolemy's day, their most distinctive feature would not have been the actual size of the intervals but rather the order of intervals within the octave.

With its extraordinary technical detail, it is hardly surprising that Book II of Ptolemy's *Harmonica* attracted so much attention from later music theorists and scholars. After all, it purports to answer many of the questions later writers had about ancient

---

[212] I make a point of this because it has been common in modern scholarship on the subject of ancient Greek tunings to work out elaborate descriptions of supposed scales indicating the number of cents by which a pitch is sharp or flat (see, most recently, West, *Ancient Greek Music*, 170–71) as if the Greeks' instruments were modern tone generators capable of producing and sustaining time and time again specific subtle gradations of pitch. While it is clear that their instruments were capable of producing sophisticated shadings of pitch, they could not have produced—except by mere chance—an entire scale of pitches specified with a tolerance of +/- 6–9 cps.

Greek music theory. How were the ancient genera actually constructed and how were they measured? What were the relative merits of the Pythagorean and Aristoxenian approaches? How did the tonoi actually work? How were the lyre and kithara tuned? How were modulations effected? Moreover, as it became known in the **g**-class manuscripts (and from there, in later editions and translations), it provided handy tables that could easily be used to construct modern instruments on which the various scales could be sounded and perhaps used in new compositions that might once again exhibit the powers attributed to ancient music.[213] Yet it is clear that much of Book II is Ptolemy's own systematic theoretical creation, however much it may also represent actual practice in second-century Alexandria. While less clear, it also seems to be the case that Ptolemy used later epitomes, such as the treatise of Cleonides, for his knowledge of the earlier tradition, and thus historical accuracy cannot be assumed in his treatment, even if that had been his purpose.[214]

Book III of the *Harmonica* is especially problematic. In the earliest manuscripts, it ends just after the beginning of chapter 14. In the **g**-class and some of the **f**-class manuscripts, later Byzantine redactors have completed (or restored) these chapters, but their work was controversial even at the time.[215] Moreover, the book is also an odd mixture of practical and metaphysical material. The first two chapters, which provide further information on the manipulation of the canon, would seem to have more properly belonged in Book II, while the remaining chapters, dealing with the metaphysical and astrological display of harmonics, at times contradict points made in Book II. There is no easy solution to any of these problems.

In the first two chapters, Ptolemy describes a number of ways in which a full double octave scale can be demonstrated. It would be possible, of course, to sound the entire scale on a canon of fifteen unison strings, but the upper notes would tend to be less sonorous than the lower because the resonating part of the string would become shorter and shorter. Ptolemy prefers instead a canon in which eight thinner strings are tuned an octave higher than the remaining seven strings.[216] Thus, when the same string-length measurements are applied on both halves of the canon, the full two-octave scale will accordingly be produced, but without a loss of sonority in the higher notes because the same string lengths will resonate as in the lower octave.

---

[213] Perhaps the best example of this is G. B. Doni's *Lyra Barberina* (see chapter 3, n. 245 *supra*), which was influenced by the earlier studies of Girolamo Mei, Vincenzo Galilei, and Giovanni Bardi (see Palisca, *Humanism*, 303–32).

[214] See, for example, pp. 443–45, 447, and 458–66 *supra*. For a fair assessment of the significance of Ptolemy's Book II, see Barbera, "Pythagorean Mathematics," 332–35.

[215] See pp. 431–34 *supra*.

Perhaps recognizing that a fifteen-string canon might not be readily available, Ptolemy also demonstrates various other ways in which the full double octave can be sounded. With a set of eight unison strings, a common bridge can be placed so that each string is divided into a 2:1 ratio, thereby producing two tones an octave apart. Each side of each string can then be further divided to produce all the desired pitches in the respective octave. Of course, the pitches produced on the shorter part of the string will once again be relatively less sonorous, and so Ptolemy suggests that four of the strings be tuned either a fifth or an octave higher than the other four. This allows the pitches to be sounded with relatively greater string lengths. In some cases, the canon can be divided by a single bridge, and in other cases, separate bridges will have to be positioned at the appropriate spots, determined by applying or adapting the measurements given in the tables in chapter 15 of Book II. Ptolemy makes it clear, however, that the bridges must be constructed so as to insure that they do not stretch the strings, and especially not to unequal degrees, since that would of course alter their pitch.

All of this very practical advice suddenly gives way in chapters 3–4 to an expression of wonderment at the rationality of all these harmonic relationships. Ptolemy observes that all things are based on the principles of matter, movement, and form. Movement, in particular, has to do with cause and means, and harmonia should be considered a cause rather than underlying material or form. Causes, too, are grouped into three types, one associated with nature, another with reason, and the third with God. Here again, harmonia is associated with the middle term, reason. Reason, which is particularly interested in order and symmetry, encompasses mind (νοῦς), art (τέχνη), and custom (ἔθος). In terms of music, harmonia is associated with each of these: the mind discovers proportions, they are exhibited by art, and custom enables them to be grasped by experience. Since this general process is essential to reason, no science should be content with merely a theoretical grasp of the beautiful; demonstration and practice are also necessary.

---

[216] Ptolemy clearly recognized that pitch and resonance were directly related to the tension and scale of the strings. In practical terms, shifting the string scale from the first to the second octave also helps to equalize the tension throughout the canon.

The most rational sciences—for Ptolemy, astronomy and harmonics—strongly depend on sight and hearing, which he views as the two most complementary senses.[217] Something seen can be communicated to the hearing through speech; something heard can be communicated to sight through writing and diagrams. Or, as Ptolemy puts it: "Through interpretations, hearing alone demonstrates things seen; through writing, sight alone announces things heard."[218] Moreover, both have the most direct access to the rational part of the soul, and in the objects that they sense, both apply a standard of beauty as well as pleasure. From these complementary senses, which are like sisters to each other, are born astronomy and harmonics, both of which depend on arithmetic and geometry.

This general hierarchy is largely derived from the traditions of Plato and Aristotle, probably as filtered through the Stoics.[219] With it in place, Ptolemy can observe that due proportion, while found to some extent in everything that has movement in itself, will be found especially in "the motions of the more perfect and the more rational in nature, that is, among divine things, the motions of the heavens, and among mortal things, certainly the motions of human souls."[220] These motions parallel on higher planes the harmonic ratios of the notes, and in the following chapters, Ptolemy will explore this harmonic paradigm.

---

[217] Aristides Quintilianus (*De musica* 3.14) also considers hearing and sight to be the two highest senses. On the senses, cf. Plato *Timaeus* 61c–69a.

[218] τὰ μὲν ὁρατὰ μόνως ἡ ἀκοὴ δεικνύουσα διὰ τῶν ἑρμηνειῶν, τὰ δ' ἀκουστὰ μόνως ἡ ὄψις ἀπαγγέλλουσα διὰ τῶν ὑπογραφῶν (Düring 94.1–3). Ptolemy emphasizes the complementary functions by using in the first phrase a verb ("demonstrates") commonly associated with visual images, and in the second phrase, one ("announces") commonly associated with orality.

[219] There are obvious echoes of Plato *Respublica* 7.11–12 (530c–d) and *Timaeus* 27c–29d and 47e–56c; Aristotle *Physica* 2.1, 8 (192b9–21, 198b10–199b30) and *Metaphysica* 7.7–9 (1032a13–1034b10) and 12; and elsewhere. For a more complete listing of possible sources, see Düring, *Ptolemaios*, 266–70; Barker, *Greek Musical Writings*, 2:371–74; and Jon Solomon, trans. and ann., "Claudius Ptolemy Harmonics" (unpublished typescript), 155–61.

Ptolemy focuses on the human soul in chapters 5–7, which he views as comprised of two parallel sets of three parallel parts: on the one hand, intellectual, sensitive, and habitual parts; and on the other hand, rational, thymic, and epithymetic parts. Some aspects of this arrangement suggest earlier treatments of the soul by Plato and Aristotle, but in view of Ptolemy's evident use of more contemporary sources for his discussion of the technical subjects in Books I and II, it is much more likely he drew on early neo-Pythagorean or neo-Platonic sources to develop his complex of associations in Book III.[221]

Within the Platonic tradition, the intellectual and rational part of the soul was concerned especially with the higher powers and virtues, while the other parts, which as a group form the irrational part of the soul, were primarily concerned with physical senses and characteristics. In Plato's *Respublica* 4.14–15, it becomes clear that the thymic part of the soul pertains especially to spirit, while the epithymetic part is the seat of the appetites. A hierarchy is obvious: the rational should control and prevail over the irrational, just as all intellectual things always have sense and habit. All things that have sense also have habit, but they do not necessarily have intellect; only some things that have habit also have sense.

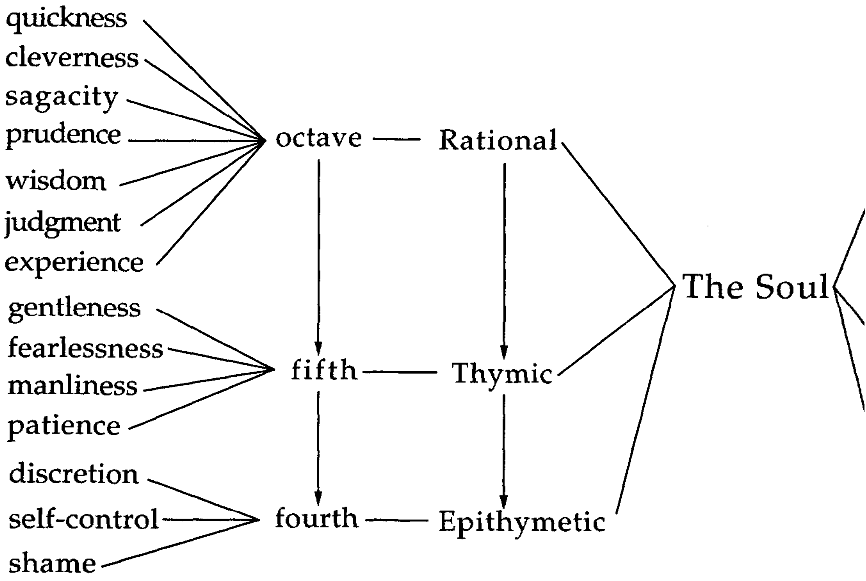
These same qualities may be identified in the octave, fifth, and fourth: the octave always contains the fifth and fourth, while the fifth always contains the fourth. Thus, the octave can be likened to the rational and intellectual part of the soul, the fifth to the thymic and sensitive part, and the fourth to the epithymetic and habitual part. Since each consonance has a certain number of species, identified earlier in the *Harmonica*, each species can be

---

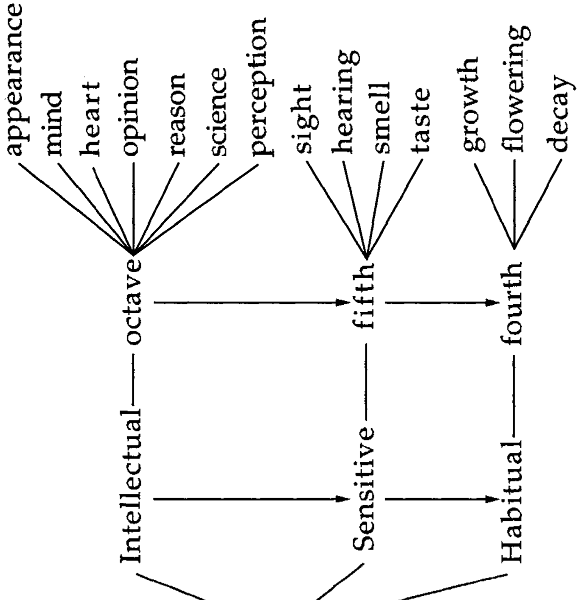
[220] αὗται δέ εἰσιν αἱ τῶν τελειοτέρων ... καὶ λογικωτέρων τὰς φύσεις, ὡς ἐπὶ μὲν τῶν θείων αἱ τῶν οὐρανίων, ἐπὶ δὲ τῶν θνητῶν αἱ τῶν ἀνθρωπίνων μάλιστα ψυχῶν (Düring 95.20–22).

[221] Solomon, "Harmonics," 162–65; and Düring, *Ptolemaios*, 270–72, identify a number of possible sources. Aristides Quintilianus makes use of the same threefold structure of the soul comprised of rational, thymic, and epithymetic parts as the basis for his own even more complex web of associations. For Aristides Quintilianus, see Mathiesen, *AQ on Music*, 27–29.

Figure 76.


quickness
cleverness
sagacity
prudence
wisdom
judgment
experience
octave
Rational
gentleness
fearlessness
manliness
patience
fifth
Thymic
discretion
self-control
shame
fourth
Epithymetic
The Soul

identified with a characteristic traditionally associated with the corresponding part of the soul. The entire complex might be represented as in figure 76.


appearance
mind
heart
opinion
reason
science
perception
sight
hearing
smell
taste
growth
flowering
decay
octave
fifth
fourth
Intellectual
Sensitive
Habitual

All these parts in relation one to another should form a grand concord; in the soul, this grand concord is the disposition of righteousness (δικαιοσύνη), while the entire harmonia of the system represents the disposition of the philosopher.

Adding to the threefold binary arrangement of the soul, Ptolemy proposes another structure by dividing principles (ἀρχαί) into the theoretical and the practical, each of which has three genera: on the theoretical side, the natural, the mathematical, and the theological; and on the practical side, the ethical, the domestic, and the political (see figure 77). These are viewed as differing in magnitude and worth, accordingly lending themselves to comparison with the three harmonic genera, which of course have internal variations in the magnitudes of their intervals.

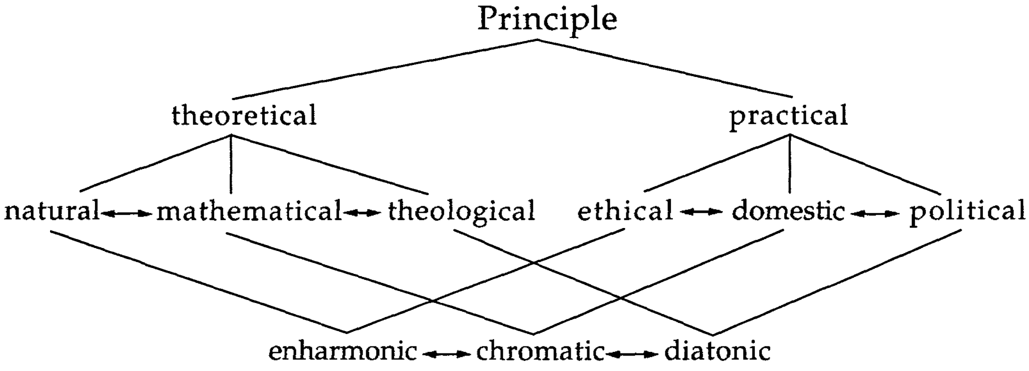


Figure 77.

Ptolemy emphasizes the reciprocal nature of the central terms. The mathematical genus relates to both the natural and the theological genera, no doubt because of the primary importance of number; the domestic genus is of course inextricably linked to ethical and political matters; and the intermediate nature of the chromatic genus has been stressed throughout Books I and II.[222]

With these pervasive relationships, it naturally follows that the various tonoi—and especially modulations from one tonos to another—could affect the disposition of the soul. Intermediate tonoi such as the Dorian are considered moderate in mood; higher tonoi such as the Mixolydian, activating; and lower tonoi such as the Hypodorian, relaxing and ennervating. Ptolemy does not offer a full explanation of why this is so, but like the neo-Platonists, he suggests that the soul has a natural resonance with the musical ratios:

---

[222] In *De musica* 1.5, Aristides Quintilianus divides music into theoretical and practical parts, but his subdivisions of these parts are rather different from the ones proposed by Ptolemy. He emphasizes the intermediate position of the chromatic genus in his explanation of its name (*De musica* 1.9), and in *De musica* 3.11, he describes a much more elaborate set of relationships among the genera, consonances, the soul and the body, and so on (see Mathiesen, *AQ on Music,* 42–43, 76–77, 84, and 177–79).

> Indeed, our souls are thoroughly affected together with the actualities of the melody, recognizing as it were the kinship of the ratios of its own constitution and modelled by the movements peculiar to the specific character of the mele, so that sometimes they are led into pleasures and relaxations and other times into wailings and contractions, sometimes stupefied and put to sleep and other times stimulated and awakened, sometimes turned to rest and moderation and other times to madness and divine suffusion, and so on, when the melos itself modulates and leads our souls to the dispositions established from the similarity of the ratios.[223]

A much fuller explanation of musical ethos is provided by Aristides Quintilianus in his *De musica*. In fact, almost all of Book II pertains to the influence of music on behavior, including some rather remarkable observations about various therapeutic methods, while Book III provides an elaborate metaphysical treatment.[224] Because a number of the technical terms employed by Ptolemy in this section are unusual but also used in similar contexts by Aristides Quintilianus and Sextus Empiricus, it is clear that their descriptions represent a tradition of musical psychology rather than merely idiosyncratic attempts at developing musico-ethical paradigms.[225]

---

[223] τοιγάρτοι καὶ ταῖς ἐνεργείαις αὐταῖς τῆς μελῳδίας συμπάσχουσιν ἡμῶν ἄντικρυς αἱ ψυχαί, τὴν συγγένειαν ὥσπερ ἐπιγινώσκουσαι τῶν τῆς ἰδίας συστάσεως λόγων καὶ τυπούμεναί τισι κινήμασιν οἰκείοις ταῖς τῶν μελῶν ἰδιοτροπίαις, ὥστε ποτὲ μὲν εἰς ἡδονὰς καὶ διαχύσεις ἄγεσθαι, ποτὲ δὲ εἰς οἴκτους καὶ συστολάς, καὶ ποτὲ μὲν καροῦσθαί πως καὶ κατακοιμίζεσθαι, ποτὲ δὲ παρορμᾶσθαι καὶ διεγείρεσθαι, καὶ ποτὲ μὲν εἰς ἡσυχίαν τινὰ καὶ καταστολὴν τρέπεσθαι, ποτὲ δὲ εἰς οἶστρον καὶ ἐνθουσιασμόν, ἄλλοτε ἄλλως τοῦ μέλους αὐτοῦ τε μεταβάλλοντος καὶ τὰς ψυχὰς ἐξάγοντος ἐπὶ τὰς ἐκ τῆς ὁμοιότητος τῶν λόγων συνισταμένας διαθέσεις (Düring 99.25–100.7).

[224] See chapter 6, pp. 541–82 *infra*.

[225] For a fuller listing of important sources pertaining to this section of Ptolemy's *Harmonica*, see Solomon, "Harmonics," 168–70; Düring, *Ptolemaios*, 272–73; Mathiesen, *AQ on Music*, 27–37; and *Adversus musicos* 15–22 (Greaves 141–49) and Greaves's introduction (pp. 21–22, 25–26, and 28).

Before undertaking the remaining chapters of Book III, Ptolemy summarizes the observations he has thus far made about the affinities of the human soul and harmonia:

> Homophones and consonances are arranged by the primary parts of souls, ideals of the musical by ideals of the virtues; differences with respect to the genera of the tetrachords are arranged to the genera of virtues by worth and magnitude, and the modulations by tonos to the alternations of ethoses in the cycles of life.[226]

Similar affinities can be observed in the motions of the heavens, and Ptolemy must now draw the *Harmonica* to a close with a demonstration of "the underlying principles of the heavens perfected by the harmonic ratios."[227]

Ptolemy begins by developing a series of associations with the zodiac, a detailed description of which appears in his *Tetrabiblos* 1.9–18.[228] As the zodiac was considered to be comprised of twelve constellations—or signs—within a circle or sphere, it lent itself naturally to various musical parallels: the cyclic nature of the positions and functions of the notes in the tonoi (at least as Ptolemy had developed the concept in Book II), the twelve whole-tones in the double octave, the harmonic ratios that result when the circle is cut into various arcs, and so on.

The relationship between the cycles of the zodiac and the notes in the double octave from proslambanomenos to nete hyperbolaion can be easily visualized. In his discussion of the tonoi, Ptolemy emphasized the cyclic redistribution of the notes against a fixed thetic characteristic octave, with the result that proslambanomenos and nete hyperbolaion were functionally equivalent, mese marking a mid-point. In the circle of the zodiac, then, proslambanomenos and nete hyperbolaion might be conceived as representing one equinoctial point, while mese represents the opposite equinoctial point at the other end of the diameter. The diameter divides the circle into two equal parts and the ratio of each half of the circle to the whole is 2:1, just as the mese divides the double octave in half and stands in the same ratio to the extreme notes. Ptolemy notes that diametrically opposed signs within the zodiac are the most active and associates this with notes that form an octave. But inasmuch as opposition, which is one of several "aspects" of the signs, is considered disharmonious,[229] this particular association seems inexplicable.

---

[226] αἱ μὲν ὁμοφωνίαι καὶ συμφωνίαι τεταγμέναι κατὰ τὰ πρῶτα μέρη τῶν ψυχῶν, αἱ δὲ τῶν ἐμμελειῶν ἰδέαι κατὰ τὰ ἰδέας τῶν ἀρετῶν, αἱ δὲ περὶ τὰ γένη τῶν τετραχόρδων διαφοραὶ τοῖς κατὰ ἀξίαν καὶ μέγεθος γένεσι τῶν ἀρετῶν, αἱ δὲ κατὰ τοὺς τόνους μεταβολαὶ ταῖς τῶν ἠθῶν ἐν ταῖς βιωτικαῖς περιστάσεσι παραλλαγαῖς (Düring 100.20–24).

[227] τὰς τῶν οὐρανίων ὑποθέσεις κατὰ τοὺς ἁρμονικοὺς συντελουμένας λόγους (Düring 100.25–26).

[228] A useful introduction to the zodiac appears in Grillot de Givry, *Witchcraft, Magic, and Alchemy,* trans. J. Courtnay Locke (Boston: Houghton Mifflin, 1931; reprint, New York: Dover, 1971), 220–39.

The zodiac also includes such aspects as trine, quartile, and sextile, and in the *Tetrabiblios* 1.13, Ptolemy specifically associates these aspects with the consonant ratios 3:2 and 4:3. Now, in chapter 9 of the *Harmonica*, he sets forth a circle of twelve parts cut into arcs by various lines illustrating opposition (AB), trine (AC), and quartile (AD) (see figure 78).

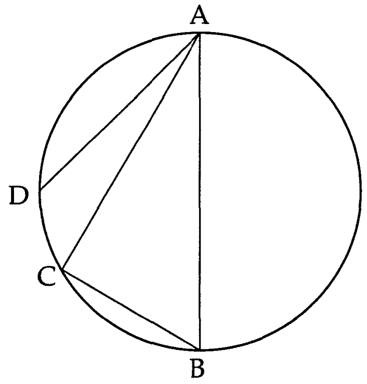


Figure 78.

Like the figure of the helicon (figure 68), this figure represents numerous examples of consonant ratios, as well as the 9:8 whole-tone. For example, the octave (2:1) is demonstrated by arcs ABCDA:AB, ABC:ADC, and AB:AD; the fifth (3:2) by arcs ABCDA:ABC, ABCD:AB, and AB:ADC; and the fourth (4:3) by arcs ABCDA:ABCD, ABC:AB, and ADC:AD. The compound intervals are represented by arcs ABC:AD (8:3, the octave-and-a-fourth), ABCDA:ADC or ABCD:AD (3:1, the octave-and-a-fifth), and ABCDA:AD (4:1, the double octave). And finally, the whole-tone is represented by arcs ABCD:ABC. If the shapes implied by these ratios were extended throughout the circle, the fifth would be like a triangle (i.e., trine), the fourth like a square (i.e., quartile). For its part, the tone represents one-twelfth of the circle, equivalent to one of the signs of the zodiac.

---

[229] Ptolemy *Tetrabiblos* 1.13.

This preliminary description allows Ptolemy to conceptualize a fuller display of the aspects of the zodiac. Although he does not provide an additional figure, one might be easily constructed from the text.

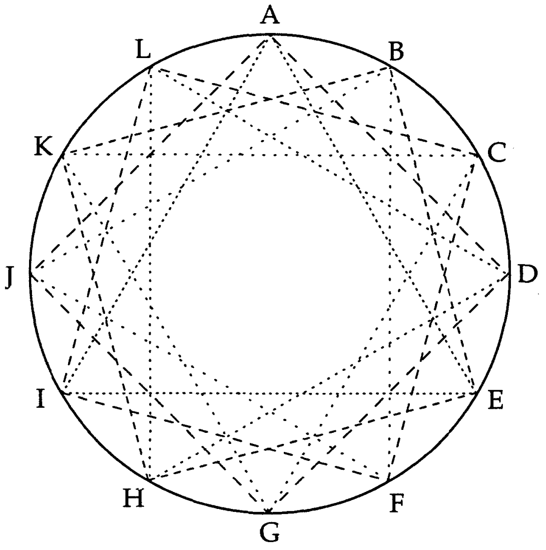


Figure 79.

A circle comprised of twelve parts can accommodate only three species of squares—ADGJ, BEHK, and CFIL (shown here with dashed lines)—just as there are only three species of the fourth, and only four species of triangles—AEI, BFJ, CGK, and DHL (shown here with dotted lines)—just as there are only four species of the fifth. The twelve parts of the circle also correspond to the twelve whole-tones (more or less) in the double octave.[230]

Aristides Quintilianus presents a more complete and involved set of musical associations with the circle of the zodiac in *De*

---

[230] Solomon, "Harmonics," 171–76, provides a number of useful references pertaining to Ptolemy's astrological model, as does Düring, *Ptolemaios*, 273–75. In his translation of chapter 8–9, Barker (*Greek Musical Writings*, 2:380–84) seems not to have recognized that when Ptolemy refers to "diameters," "squares," and "triangles," he is not referring simply to geometric shapes but rather is employing the astrological terminology for the aspects of the zodiac.

Ptolemy does not draw this additional association, but it may not be entirely coincidental that the ratio 12:11 appears as the smallest interval in his equal diatonic genus (see pp. 450 and 472 *supra*) and as the intermediate interval in his intense chromatic genus (see pp. 448 and 470 *supra*).

musica 3.23, and in fact, marked parallels run throughout the last few chapters of Ptolemy's *Harmonica* and the last part of Aristides Quintilianus's *De musica*.[231] Neither author was unique, however, in detecting musical designs in the cosmos. Contemporary with Ptolemy, both Plutarch (especially in *Platonicae quaestiones* and *De animae procreatione in Timaeo*) and Theon of Smyrna (in *Expositio rerum mathematicarum ad legendum Platonem utilium*) exhibit this sort of incipient neo-Platonic cosmology.[232]

Consonance is not the only level on which analogies must be drawn in order to demonstrate the paradigmatic nature of music. Ptolemy identifies five additional musical phenomena for further analogies: the movement of consecutive notes up or down, the genera, the tonoi, the tetrachords, and the notes. All of these involve astronomical parallels with the movements of the stars and the planets, as these were understood at the time.

Long before Ptolemy's time, astronomers had made sophisticated observations about the movements of the heavens, many of which are conveniently summarized in Theon of Smyrna's *Expositio*. He explains that the starry sphere, in which is found the zodiac, moves from east to west around an axis passing through the poles (the Earth, of course, is understood as the center of the construction). The planets, which also move from east to west with the universe as a whole, move as well at unequal rates from setting to rising—that is, from west to east—with respect to the zodiac, which is oblique to the three parallel circles of the tropic of summer, the tropic of winter, and the celestial equator, inclined at an angle of ca. 23.5° to the celestial equator (figures 80 and 81 exhibit these circles and the circle of the zodiac). The axis of planetary movement is perpendicular to the zodiac. Because the planets move at differing speeds, some of them—such as the sun and the moon—always appear to be moving more slowly than the zodiac, while others sometimes appear to be moving ahead, stopping, and then moving backwards, phenomena caused by the planets themselves moving either in eccentric circles or in epicycles. Three particular types of planetary motion thus resulted: by longitude, that is, movement around the zodiac; by altitude, that is, movement towards and away from the earth; and by latitude, that is, movement between the two tropics. Ptolemy bases several of his analogies on these three types of movement.[233]

---

[231] See Mathiesen, *AQ on Music*, 48–51 and 193–95.

[232] See pp. 395–412 *supra*. For a general treatment of music and cosmology, see Mathiesen, "Music, Aesthetics, and Cosmology," 37–64.

Ptolemy likens the arc created by the rising and setting of the planets to the arc created by a continuous ascending and descending sequence of notes from lowest to highest. The lowest notes are like the points of rising or setting because these are the points where appearance and sound begin and end, while the highest notes are like the intermediate position of the planets because these are the points most distant from the vanishing point. This type of musical motion might thus be seen as analogous to longitudinal movement.

If the planets move in epicycles as they pass through the heavens, they experience movement by altitude inasmuch as their distance from earth will be greater at apogee and lesser at perigee. Moreover, if the rotation of their epicycles is in the same direction as their orbital rotation, the overall velocity of their rotation will range from greatest at apogee to least at perigee.[234] Building on these premises, Ptolemy associates the enharmonic genus with the slowest planetary velocity, the diatonic with the greatest velocity, and the chromatic with the intermediate. He recognizes, of course, that this analogy is more effective for the chromatic genus than for the other genera: planets intermediate in distance will also always be intermediate in velocity, but the velocity of the others at any given point will depend on the rotation of their epicycles.

The third form of movement, by latitude, suggests parallels with modulations among the tonoi (see figure 80). Of Ptolemy's seven tonoi, the Dorian occupies the most central position, and it is accordingly likened to the celestial equator (circle D). The Mixolydian and Hypodorian are then naturally assigned respectively to the tropics of summer and winter (circles A and G). Four additional circles are needed in order to cut the circle of the zodiac into its twelve parts, but Ptolemy's description of the method by which this results is extremely vague; a fair knowledge of astronomical principles is simply assumed. Figure 80, however, may clarify his analogy.[235] As the various circles surround the sphere, the circle of the zodiac touches the tropics of summer and winter at only a single point (1 and 12). Since it actually crosses the other circles, there are two points of intersection, one on each side of the sphere. The celestial equator is intersected at points 6 and 7, and the remaining points of intersection are readily apparent.

---

[233] These motions are summarized by Theon *Expositio* (Hiller 134–35); for the rest, see Theon *Expositio* (Hiller 129–33 and 147–72). A useful survey of early Greek astronomy (with helpful diagrams) is provided by G. E. R. Lloyd, *Early Greek Science: Thales to Aristotle,* Ancient Culture and Society (New York: W. W. Norton, 1970), 80–98; and idem, *Greek Science after Aristotle,* Ancient Culture and Society (New York: W. W. Norton, 1973), 53–74.

[234] The moon's epicycle rotates in contrary motion. The sun may be considered as moving on an eccentric circle or an epicycle; in the latter case, it too rotates in contrary motion (Theon *Expositio* [Hiller 175]).

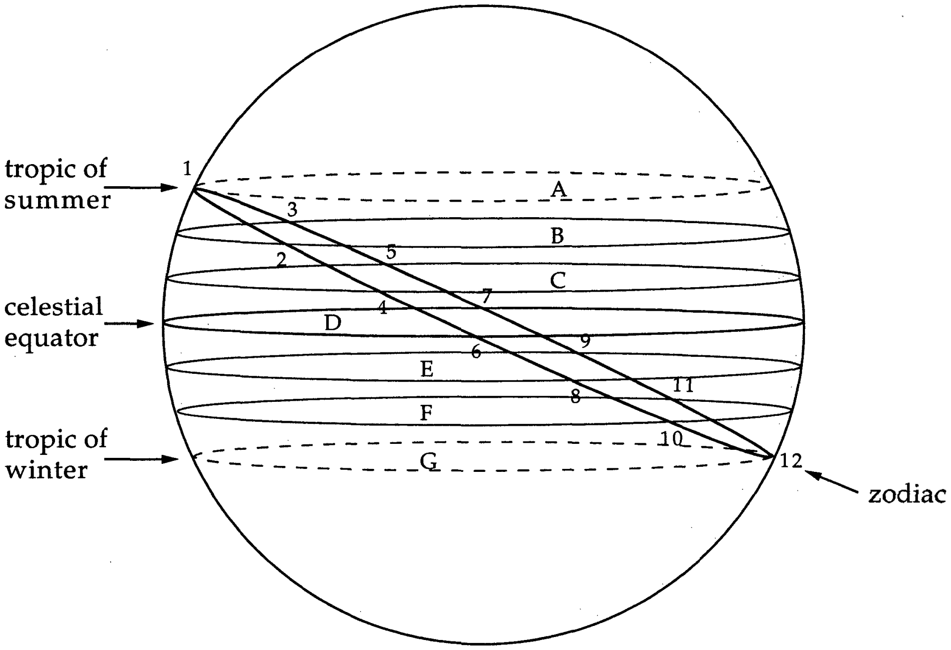


Figure 80.

Ptolemy does not specifically associate the other tonoi with the four new circles, but the sequence of the tonoi outlined in Book II make it clear that the Lydian would correspond to circle B, the Phrygian to C, the Hypolydian to E, and the Hypophrygian to F.

Since the synemmenon tetrachord had been eliminated by Ptolemy earlier in the *Harmonica*, it is a simple matter to draw parallels between the four remaining tetrachords, the four phases of the moon, and the various oppositions that create risings and settings of planets other than the sun.[236] Thus, for example, the first lunar crescent is considered to be like the hypaton tetrachord, the former marking the first waxing of the moon, the latter the first few notes of the scale; the first half-moon to the meson; the second half-moon to the diezeugmenon; and the final crescent to the hyperbolaion. As each tetrachord contains approximately two-and-a-half tones and there are also two tones of disjunction, the total number of tones, twelve, corresponds to the twelve signs of the zodiac, although this association is not explicitly stated by Ptolemy.[237]

---

[235] In two-dimensional drawings, the zodiac is sometimes shown ascending towards the left, sometimes towards the right. There is no difference; it is simply a matter of the rotation of the sphere.

In the earliest manuscripts, the *Harmonica* ends abruptly just after the beginning of chapter 14 in Book III, and the last part of the treatise was completed by Nicephorus Gregoras and Isaac Argyros.[238] While the supplements they provided in Book II were largely based on descriptive prose found elsewhere in the treatise, the material added to Book III seems to have been primarily extrapolated from chapters 8 and 9. Gregoras begins by recalling the ratios and shapes described in chapter 9 (see figures 78–79 *supra*). The 360 degrees of the circle can be organized into such aspects as opposition (180°), trine (120°), quartile (90°), and sextile (60°), and he associates these points respectively with proslambanomenos, hypate meson, nete diezeugmenon, and nete hyperbolaion. In fact, however, if 180° is to be the proslambanomenos, then 90° should correspond to the mese, 60° to the nete diezeugmenon, and 45° (which corresponds to semi-quartal aspect, representing an eight-fold division of the circle) to the nete hyperbolaion. Gregoras may not have wanted to extend the numbers as far as an eight-fold division since Ptolemy does not include this particular aspect in the *Tetrabiblos*, but in any case, the set of associations remains problematic. In the very next chapter, Gregoras implicitly associates 90 with the mese as the mean between the octave formed by 60 and 120, and this suggests that the error in chapter 14 may be scribal. If so, it occurred very early in the transmission: Barlaam recognized this defect in his *Refutatio*[239] and included it as one of the many criticisms leveled at Gregoras's work.

---

[236] These are succinctly described in Theon *Expositio* (Hiller 136–38). Theon observes that conjunctions with the sun, i.e., appearances (φάσεις) and disappearances (κρύψεις) or risings (ἀνατολαί) and settings (δύσεις), differ for each planet. Kronos, Zeus, and Ares always set in the evening and rise in the morning; the moon rises in the evening; Hermes and Aphrodite sometimes rise and set in the evening, sometimes in the morning.

[237] No diagrams survive in these chapters, but Düring (*Ptolemaios*, 133) —unlike Solomon and Barker—supplements his translation with a helpful figure. Solomon ("Harmonics," 182–83) does, however, supply a number of useful references to supporting passages in the *Almagest* and the *Tetrabiblos*.

[238] See pp. 431–34 *supra*.

In chapter 15, Gregoras draws out additional mathematical ratios. 90 forms a mean between 120 and 60, creating the two first consonant ratios, 4:3 and 3:2, together with the octave represented by the extremes. In respect to the 360 degrees of the full circle, 90 forms the ratio of the double octave. The circle can, of course, also be considered in terms of the twelve signs of the zodiac, and all the necessary harmonic proportions will appear here as well, whether in terms of pure numerical ratios or in terms of the various polygons already shown by Ptolemy in chapter 9.

The significance of chapter 9 to Gregoras's completion of the *Harmonica* is underscored by the fact that he derived the final chapter of Book III from an interpolation or gloss to chapter 9 that appears in the f-class manuscripts, that is, those representing a Byzantine redaction prior to the time of Gregoras.[240] In this gloss, Kronos (Saturn) is associated with nete hyperbolaion, Zeus (Jupiter) with nete diezeugmenon, Ares (Mars) with nete synemmenon, and Aphrodite (Venus) with mese. Kronos is further associated with the sun, Ares with the moon. As the planets align themselves in the various aspects, they bring good or evil, in accord with the harmonic ratios and the various triangles of the zodiac they occupy (see figure 81).[241]

---

[239] See p. 433 *supra*.

[240] It also appears independently in four manuscripts, together with Barlaam's *Refutatio* in Neapolitanus gr. 262 (III.C.4) (14th–15th century), Vaticanus Urbinas gr. 77 (16th century), Lugdunensis Bibliothecae Publicae gr. 16D (17th century), and Lugdunensis Perizonianus gr. Q.22 (17th century). See Mathiesen, *RISM BXI*, **203**, **255**, **276**, and **283**.

[241] The author of the gloss (I am assuming it is not Ptolemy) takes it for granted that the reader will be familiar with the triangles of the zodiac, which are described in Ptolemy *Tetrabiblos* 1.18. Each triangle is formed by three signs of the zodiac. The northwest triangle embraces Aries, Leo, and Sagittarius, which are governed by the sun (day) and Zeus (night); the southeast triangle touches Taurus, Virgo, and Capricorn, governed by Aphrodite (day) and the moon (night); the northeast triangle is outlined by Gemini, Libra, and Aquarius, governed by Kronos (day) and Hermes (night); and the southwest triangle is formed

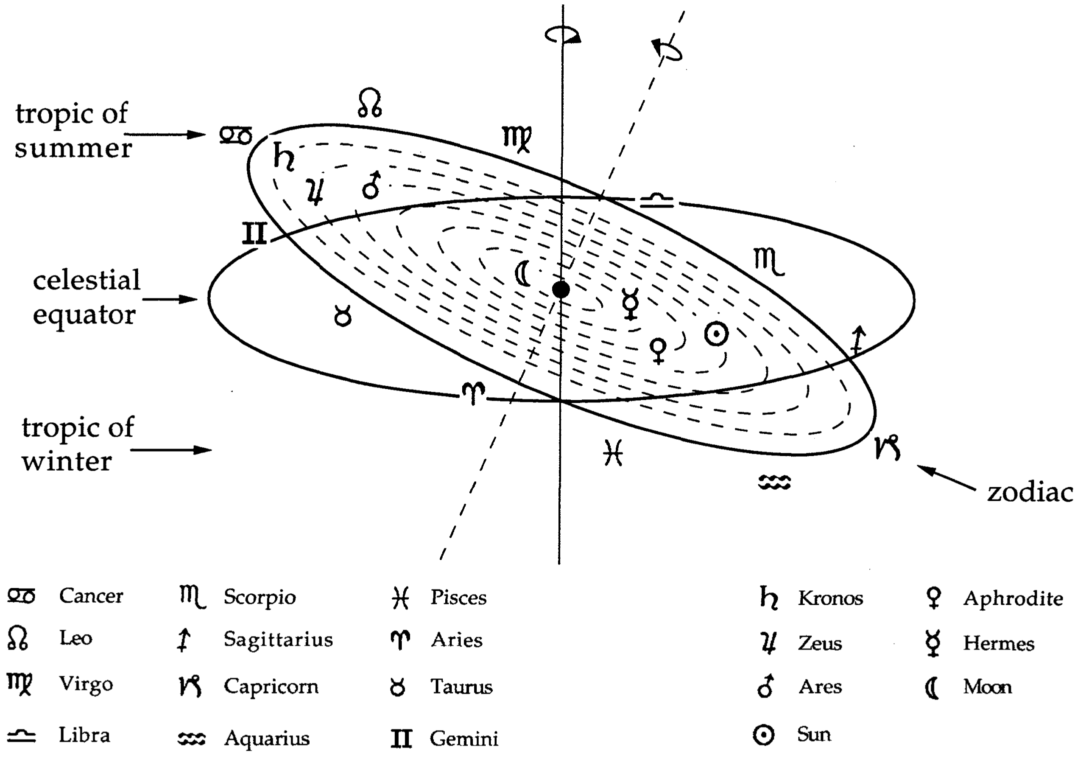

tropic of summer
celestial equator
tropic of winter
zodiac
♋ Cancer
♌ Leo
♍ Virgo
♎ Libra
♏ Scorpio
♐ Sagittarius
♑ Capricorn
♒ Aquarius
♓ Pisces
♈ Aries
♉ Taurus
♊ Gemini
♄ Kronos
♃ Zeus
♂ Ares
☉ Sun
♀ Aphrodite
☿ Hermes
☾ Moon

Figure 81.

This arrangement of planets differs from the arrangement described by Nicomachus in chapter 3 of his *Manuale harmonices,* Theon of Smyrna in his *Expositio,* and Aristides Quintilianus in Book III, chapter 21 of his *De musica.*[242] In all these sources, the various planets fill out a heptachord, two heptachords (in the case of Aristides Quintilianus), or an octave.

If the gloss were logically extended by supplying the remaining planetary associations in accord with the order of their orbits, it might be supposed that the sun, which falls between Ares and Aphrodite, would be associated with the paramese; Hermes,

---

by Cancer, Scorpio, and Pisces, governed by Ares, with Aphrodite (day) and the moon (night).

[242] See pp. 396–97 and 428 *supra,* and 570–71 *infra.* For general introductions to these "harmonies of the spheres," see Karl von Jan, "Die Harmonie der Sphären," *Philologus* 52 (1894): 13–37; Théodore Reinach, "La musique des sphères," *Revue des études grecques* 13 (1900): 432–49; Fritz Erckmann, "Sphärenmusik," *Zeitschrift der Internationalen Musikgesellschaft* 9 (1907–8): 417–25; Jacques Handschin, "Die Lehre von der Sphärenharmonie" and "Die Sphärenharmonie in der Geistesgeschichte," in *Gedenkschrift Jacques Handschin* (Bern: P. Haupt, 1957), 359–69; and Gunther Scheda, "Planeten und Sphärenmusik in der neronischen Kaiserideologie," *Hermes* 94 (1966): 381–84.

which follows Aphrodite, with the hypate meson; and the moon with the hypate hypaton. The earth, as the stable center of the universe, might not be supposed to produce any note, although Alexander of Aetolia did associate it with the lowest tone of his scale, according to Theon of Smyrna; perhaps it is supposed to represent the proslambanomenos. On the other hand, the so-called Canobus Inscription, commonly attributed to Ptolemy, assigns the moon to the hypate meson and Hermes to the same note as Aphrodite, while the proslambanomenos is associated with the lower two elements, earth and water, and the hypate hypaton with the higher two elements, air and fire.[243]

The gloss—and the *Harmonica* as a whole—ends abruptly with some observations about the planetary aspects: Kronos is normally considered an evil planet, but when it is moderated by Zeus or is in trine with the sun, it can be positive; all its aspects with the moon or Aphrodite are negative. Ares is considered generally negative, but when it is in trine with the moon or Aphrodite, it too can be positive; its aspects with the sun and with Zeus are negative. All this accords with the *Tetrabiblos* but ignores the ways in which the characteristics of the aspects are modified by the various houses and the signs of the zodiac.

It is simply not possible to reconstruct with any certainty the precise content and arrangement Ptolemy may have had in mind for the final chapters of his *Harmonica*. The text that Gregoras extracted to create chapter 16 was well suited as a gloss to chapter 9, but as a final chapter intended as the capstone to a comprehensive work on harmonics, it is, as Barlaam discerned, clearly inadequate.

In the end, one conclusion is inescapable: as it has survived, the *Harmonica* begins a decline in Book II that rapidly accelerates until the end of Book III. The polemical tone of Book I of the *Harmonica* can scarcely be reconciled with the belief that Ptolemy himself would have allowed all the inconsistencies of Book III to pass without comment, and in the form completed by Gregoras and Argyros, the treatise cannot be taken as a full and accurate reflection of Ptolemy's intentions. Nevertheless, the multiple versions of the text, the glosses transmitted with it in a number of manuscripts, and the contemporary refutation of Barlaam provide unusual evidence of the extent to which scientific books of this sort might be reworked and supplemented in the course of preserving them for later readers. In its scope and wealth of detail, not to mention the originality of its own theoretical analysis, the *Harmonica* goes far beyond the other musical treatises of the second century C.E. Even in its defective state, it represents the full flowering of the historical, antiquarian, and scientific interests that were so typical of the period, and as such, for better or worse, the *Harmonica* came to be regarded by Latin, Byzantine, and Arabic writers of the Middle Ages and the Renaissance as the preeminent treatise on ancient Greek music theory.

---

[243] Barlaam recognized the logical inconsistency of assigning one of the planets to the nete synemmenon when Ptolemy had earlier proposed that the synemmenon tetrachord was superfluous, as well as numerous other deficiencies. Nevertheless, modern scholars have tried valiantly to make the last chapters seem coherent. In the case of chapter 16, various solutions are provided by Düring, *Ptolemaios*, 136 and 281–84; Barker, *Greek Musical Writings*, 2:390–91; and Solomon, "Harmonics," 187–88.

* * *

The musical treatises of the second century C.E. reflect the first stage of scholarship in the field of ancient Greek music theory, and two trends are immediately apparent. On the one hand, the author of the Plutarchean *De musica* was primarily interested in literary and historical matters. He was concerned with the "inventors" of music and the various traditions they established, the musico-poetic forms, and musical style, ethics, and metaphysics; theoretical detail appears primarily as an adjunct to larger historical considerations. Presented in the broad form of a dialogue, the author clearly aspires to a certain literary quality.

On the other hand, authors such as Cleonides and Theon of Smyrna were interested first and foremost in technical and theoretical considerations, particularly as these could be distilled and thereby made readily accessible to readers to whom "ancient Greek" culture—that is, especially the period extending roughly from the fifth through the first part of the third century B.C.E.—appealed as a subject of rediscovery and revival. While neither seems to have been much concerned with literary style as such, both authors adopt a position of disinterested scholarship, providing clear and effective summaries of their topics and preserving in many cases technical details that no longer survive in earlier sources.

Between these two positions, the treatises of Nicomachus and Ptolemy exhibit both trends. Nicomachus's *Manuale harmonices* is unique among the early musical treatises in its epistolary style, and like the *Harmonica* of Ptolemy, it is marked by a strong awareness of the competing Pythagorean and Aristoxenian traditions, which it attempts to some extent to reconcile. Ptolemy's *Harmonica* emphasizes technical issues supported by a wealth of theoretical detail, but its overall design—whether or not the final realization is actually Ptolemy's—clearly points to a metaphysical view of music as a paradigm for a higher universal order and understanding.

As would be expected, later Greek musicographers developed these trends, which nevertheless also underwent considerable transformation in the period of late antiquity. In the treatises of Bacchius and Alypius, technical and theoretical considerations are reduced to little more than a catechism and a series of tables. By contrast, the treatise of Aristides Quintilianus develops an extended and intricate complex of music theory, ethics, and metaphysics, going far beyond the incipient neo-Platonism of Nicomachus and Ptolemy. Gaudentius clearly follows several of his predecessors in attempting both a certain literary style and a synthesis of Aristoxenian and Pythagorean traditions.

Subsequent writers, beginning with Boethius and Martianus Capella and extending into the Renaissance and beyond, were profoundly influenced in their conceptions of ancient Greek music and music theory by the second-century treatises, which asked and answered many of the same questions that interested later musicians. The extent to which these answers actually reflected the earlier traditions cannot be precisely measured, but their impact on the conception of ancient Greek music theory cannot be overestimated.

BLANK PAGE

VI

Music Theory III: Late Antiquity

By the close of the second century C.E., the great empire of Marcus Aurelius had fallen into desuetude. Under Commodus (reigned 180–1 January 193), the absolute power of the emperor, effectively eclipsing the Senate, spread a perpetual terror over Rome, the citizenry increasingly retreated from public life, and the economy of the empire began to collapse. After his assassination, a succession of more than twenty emperors followed over the next century, some surviving a mere matter of weeks, until the extended reigns of Diocletian (284–305) and Constantine (306–23 in coalition, 324–37 as sole emperor). But even during this period of turmoil, and later in the fourth and fifth centuries, the emperors continued a practice that accorded special privileges to teachers and education, while individual cities established municipal schools, which continued to offer instruction in the various disciplines of the classical tradition. Nor were the new Christian schools indifferent to the ways in which the classical tradition could be reshaped to serve Christian aims.[1] Thus, Greek music theory remained a subject of interest and importance during the last centuries before the fall of Rome in 455 and the end of the Western empire in 476.

In the third, fourth, and fifth centuries, Greek music theorists were less absorbed with the historical, antiquarian, and scientific concerns that had characterized the treatises of the second century. For the most part, their concerns were scholastic and perhaps practical, but at least one writer viewed the Greek musical tradition in larger allegorical and religious terms. The distance of their treatises from the living tradition of ancient Greek music was considerable—though it is difficult to assign precise dates to these later writings. They represent the extremes between technical compendia and elaborate literary works, anticipated in earlier treatises: on the one hand, the careful scientific categories and definitions of earlier treatises were taken out of context and reduced to little more than a didactic catechism in the treatise of Bacchius Geron; on the other hand, the conscious literary style of the Plutarchean *De musica* or Nicomachus's *Manuale harmonices* was expanded to extraordinary lengths in the treatise of Aristides Quintilianus. It is also particularly noteworthy that discussions of musical notation are prominent in the later treatises, while in the earlier treatises, notation is either dismissed as insignificant[2] or simply not mentioned at all. The prominence of notation suggests that the later treatises were written for a limited audience of initiates, musical or otherwise. In fact, both Gaudentius and Aristides Quintilianus make it clear in their treatises that they are not addressing a general audience of musical amateurs, and the *Introductio musica* of Alypius could hardly have been intended for anyone other than a specialist.

---

[1] Henri Irénée Marrou, *A History of Education in Antiquity*, trans. George Lamb (London: Sheed and Ward, 1956), 299–329.

The clearly distinct theoretical trends of these later treatises give them a particular significance in the history of ancient Greek music theory in their own right. But of greater importance, three of the theorists—Gaudentius, Aristides Quintilianus, and Alypius—were the immediate sources for writers such as Cassiodorus and Martianus Capella who together with Boethius were the earliest to preserve and transmit the tradition of ancient Greek music theory to the Latin readers of the Middle Ages. Thus, these later Greek writers represent both the final stages of Greek music theory in antiquity and, as filtered through their Latin interpreters, the first stages of ancient Greek music theory as it was known in the Middle Ages.

Gaudentius

In the *Harmonica* of Claudius Ptolemy, the Aristoxenian and Pythagorean approaches to harmonics are presented as fundamentally opposing formulations, to the advantage of Ptolemy's exposition of his own system. Yet this opposition, which has now become a commonplace of modern scholarship, is anything but clear in the corpus of ancient Greek music theory as a whole. As has been seen, writers such as Nicomachus and Theon of Smyrna, obvious Pythagorean adherents in their approach, make use of material associated with the Aristoxenians, and Aristoxenus himself, born in a Pythagorean center and thoroughly familiar with the Pythagorean tradition, reserves his criticism for the Harmonicists, who were certainly not Pythagoreans.[3] Gaudentius, too, conflates Aristoxenian and Pythagorean approaches to harmonics in his *Harmonica introductio* but departs from the model of his predecessors by concluding his treatise with a partial explanation of the Greek notational system.

---

[2] Aristoxenus *Elementa harmonica I* (section I/B/10 [da Rios 49.1–51.7]).

Nothing is known of the life of Gaudentius. He is not mentioned by any of the Greek musical writers of the second century C.E., but Cassiodorus knew his treatise, which must therefore have been written prior to the sixth century. Cassiodorus read Gaudentius's work in a Latin translation credited to the otherwise unknown Mutianus and used the treatise in his own discussion of the musical consonances. He cites Gaudentius both at the very beginning of the section on music (*Institutiones* 2.5) and at the end, where he singles him out for special praise: "if you read him over again with close attention, he will open to you the courts of this science."[4] While a precise date cannot be assigned to Gaudentius, the eclecticism, content (especially the section on notation), and literary style of his treatise suggest that it was probably written in the third or fourth century C.E.

The *Harmonica introductio* is transmitted in thirty-one manuscripts, the earliest of which is the twelfth-century Vaticanus gr. 2338, one of the two earliest and most important collections of ancient Greek music theory, which also contains the *Sectio canonis* and the treatises of Aristoxenus, Cleonides, and Theon of Smyrna.[5] Unlike all of the earlier treatises, the textual tradition of the treatise of Gaudentius is relatively uncomplicated: there are no multiple attributions, and with certain variants, the form is consistent. In the earliest manuscripts, the treatise is not obviously associated with any other text, but in later manuscripts, it is commonly copied following the treatise of Alypius—probably because of the parallel sections on notation—and preceding either the *Manuale harmonices* of Nicomachus or the *Expositio rerum mathematicarum ad legendum Platonem utilium* of Theon of Smyrna, no doubt because of the Pythagorean associations.[6]

---

[3] See pp. 390, 395–98, 404–5, and 419–21 *supra*.

[4] "quem si sollicita intentione relegatis, huius scientiae vobis atria patefaciet" (Mynors 149.17–19).

[5] See Mathiesen, *RISM BXI*, **234**.

Gaudentius begins his treatise with the arresting statement: "I sing for the intelligent; uninitiated, close the door!"[7] By paraphrasing a traditional Orphic command, he captures the reader's interest at once and endows his treatise with a certain aura of mystery.[8] The opening statement is not, however, merely a rhetorical flourish: in defining the subject of his treatise, Gaudentius wants to stress its specialized nature and the importance of a refined sense of hearing joined to the intellectual capacity for reason. He warns the reader at the outset:

> Whoever has come to hear the discourse but does not hear a note plainly and has not trained his hearing, let him go away and close the door on these sounds, for his ears—though present—will be stopped up by a sense that does not know beforehand the matters of this discourse. As we begin, let us speak on the voice to those exactly trained by experience.[9]

Gaudentius's emphasis on aural acuity combined with reason recalls Aristoxenus's maxim in the first book of the *Elementa harmonica*: "For the musician, exactness of sense has nearly the rank of a principle, for it is not possible for someone who senses poorly to speak well about things he does not sense in any way at all."[10]

---

[6] For a comprehensive list of editions and translations of the treatise, see the Bibliography under "Gaudentius." The translations used in this section come from "Gaudentius, *Harmonic Introduction*," in *Strunk's Source Readings in Music History*, vol. 1, *Greek Views of Music*, ed. Thomas J. Mathiesen (New York: Norton, 1998), 66–85.

[7] 'Αείδω ξυνετοῖσι, θύρας δ' ἐπίθεσθε βέβηλοι (Jan 327.3).

[8] φθέγξομαι οἷς θέμις ἐστί· θύρας δ' ἐπίθεσθε βέβηλοι, quoted by Pseudo-Justin Martyr (fl. 3rd–5th century C.E.) in his *Cohortatio ad gentiles*. There is, of course, no way to know whether Gaudentius adapted the quotation from this source, but it does accord with the general *floruit* proposed for him.

[9] ὃς δὲ οὐδὲ φθόγγου κατακούων οὐδὲ τὴν ἀκοὴν γεγυμνασμένος ἥκει τῶν λόγων ἀκουσόμενος, οὗτος ἀπίτω τὰς θύρας ἐπιθεὶς ταῖς ἀκοαῖς. ἐμφράξει γὰρ τὰ ὦτα καὶ παρὼν τῷ μὴ προγινώσκειν ταῦτα αἰσθήσει, περὶ ὧν οἱ λόγοι. λέγωμεν δὲ ἡμεῖς ἀρξάμενοι τοῖς ἀκριβῶς ἐν τῇ πείρᾳ γεγυμνασμένοις περὶ φωνῆς (Jan 327.14–20).

Gaudentius defines his discourse as pertaining to the seven traditional categories (notes, intervals, genera, scales, tonoi, modulation, and melic composition) associated with the Aristoxenians, although he never specifically mentions them—or Aristoxenus—in his treatise. Nevertheless, the first several sections are written as if Gaudentius were an Aristoxenian. In the *Harmonica,* Aristoxenus is much concerned with distinctions involving motion and position of the voice (*De principiis,* sections II/A and II/P) and the identification of patterns that might be considered melodic or unmelodic (*De principiis,* section XV, and *Elementa harmonica II,* section I/A). Gaudentius too begins with these same topics, in wordings that suggest he is following Aristoxenus's *Harmonica* itself. This leads him in section 2 to the familiar definition of a note ("a note is the falling of the voice upon one pitch; pitch is a tarrying and standing of the voice"), expanded by the further statement: "Whenever the voice seems to stop on one pitch, we say that the voice is a note that can be ordered in melos."[11] While the first part of the definition is repeated in many of the later Aristoxenian sources, the full definition appears only in Aristoxenus (*De principiis,* section VIII).[12] Such instances suggest very strongly that Gaudentius relied directly on Aristoxenus rather than one of the Aristoxenian intermediaries. This is unusual for a later treatise, as is Gaudentius's mention of chronos within an introductory treatise on harmonics. Aristoxenus, of course, wrote a separate treatise on rhythm, but rhythm is mentioned only briefly in the first book of his *Elementa harmonica I* (section I/B/1–2).

In the next several sections of the treatise, Gaudentius proceeds to define, in terms familiar from earlier treatises, intervals, tonoi, scales, and genera. But he does not simply appropriate earlier material; it is clearly reshaped and adapted for his particular audience. In his discussion of intervals (section 3), for example, Gaudentius observes that the distinction between consonant and dissonant (or "inconsonant" [ἀσύμφωνον], as he sometimes says) and between musical and unmusical "lies for the most part in the difference of the sound; nevertheless, it lies to a small extent in reason,"[13] a statement that harkens back to the opening of the treatise. Gaudentius promises to elaborate on this point later in the treatise, and when he returns to the subject of intervals (in sections 8–9), he provides a unique definition of the paraphonic (παράφωνον) interval. According to Theon of Smyrna, the paraphonic intervals—the fifth and the fourth—are a subclass of consonance, distinct from the purer antiphonic (ἀντίφωνον) intervals, the octave and the double octave. Gaudentius, however, defines the paraphonic intervals as "between consonant and dissonant," giving as examples the three tones from parhypate meson to paramese and the two tones from diatonic meson to paramese; these sound consonant, he says, when employed in the instrumental accompaniment.[14] This is a remarkable definition on several counts: first, Gaudentius is clearly referring to the intervals of a tritone and a ditone; and second, the statement implies that by the time of Gaudentius, such intervals might have been commonly used in instrumental accompaniments.

---

[10] τῷ δὲ μουσικῷ σχεδόν ἐστιν ἀρχῆς ἔχουσα τάξιν ἡ τῆς αἰσθήσεως ἀκρίβεια, οὐ γὰρ ἐνδέχεται φαύλως αἰσθανόμενον εὖ λέγειν περὶ τούτων ὧν μηδένα τρόπον αἰσθάνεται (da Rios 42.21–43.2).

[11] Φθόγγος δέ ἐστι φωνῆς πτῶσις ἐπὶ μίαν τάσιν· τάσις δὲ μονὴ καὶ στάσις τῆς φωνῆς. ὅταν οὖν ἡ φωνὴ κατὰ μίαν τάσιν ἑστάναι δόξῃ, τότε φαμὲν φθόγγον εἶναι τὴν φωνὴν οἷον εἰς μέλος τάττεσθαι (Jan 329.7–11).

[12] φωνῆς πτῶσις ἐπὶ μίαν τάσιν ὁ φθόγγος ἐστί· τότε γὰρ φαίνεται φθόγγος εἶναι τοιοῦτος οἷος εἰς μέλος τάττεσθαι ἡρμοσμένον ⟨τὸ⟩ ἑστάναι ἐπὶ μιᾶς τάσεως. ὁ μὲν οὖν φθόγγος τοιοῦτός ἐστίν (da Rios 20.16–19). See pp. 305–6 *supra*.

When Gaudentius turns his attention to the genera (sections 5–6), he dutifully refers to the enharmonic and chromatic genera, briefly describing their intervallic patterns, but adds that in the following discussion of scales, he will employ only the diatonic genus because "the use of the remaining two genera seems to have lapsed."[15] Later in the treatise (section 16), though, he does provide a numerical diagram for the intense chromatic genus (διάγραμμα χρωματικοῦ γένους συντόνου). Apart from this appearance, the characterization of one of the chromatic genera as "intense" is distinct to Claudius Ptolemy and his commentator, Porphyrius (all the other theorists refer to a "whole-tone" chromatic genus). While Gaudentius's division is not the same as any of Ptolemy's divisions, his use of this distinctive phrase certainly suggests an acquaintance with either the *Harmonica* of Ptolemy or Porphyrius's commentary. Likewise, in his description of all the notes of the Greater and Lesser Perfect Systems (sections 6–7), there are numerous references to the position (θέσις) and function (δύναμις) of the notes, suggesting once again that Gaudentius was familiar with the nomenclature of Ptolemy.

---

[13] ἐν τῇ τοῦ ἤχου μάλιστα ἀπόκειται· οὐ μὴν ἀλλὰ καὶ τῷ λόγῳ μικρὰ (Jan 330.18–19).

[14] οἱ μέσοι μὲν συμφώνου καὶ διαφώνου, ἐν δὲ τῇ κρούσει φαινόμενοι σύμφωνοι· ὥσπερ ἐπὶ τριῶν τόνων φαίνεται ἀπὸ παρυπάτης μέσων ἐπὶ παραμέσην καὶ ἐπὶ δύο τόνων ἀπὸ μέσων διατόνου ἐπὶ παραμέσην (Jan 338.3–7). Cf. p. 417 *supra*.

[15] τῶν δὲ λοιπῶν δυοῖν ἡ χρῆσις ἐκλελοιπέναι κινδυνεύει (Jan 332.2–3).

Gaudentius's discussion of the consonant intervals (sections 9–10) follows Aristoxenus, Cleonides, Theon of Smyrna, and Ptolemy in accepting the interval of an octave-and-a-fourth as consonant, but it is remarkable that he presents these intervals not only in Aristoxenian terms as the number of tones contained in each interval but also in Pythagorean terms as numerical ratios, even though the Pythagoreans regarded this interval as dissonant. In order to present the octave-and-a-fourth as a consonance occurring within the double octave, 4:1, Gaudentius adopts a series of integers based on 24 and 6. Thus, the consonances may be expressed in numerical terms as 24:18 (the fourth), 24:16 (the fifth), 24:12 (the octave), 24:9 (octave-and-a-fourth), 24:8 (octave-and-a-fifth), and 24:6 (the double octave).[16] These two sections represent the clearest example of Gaudentius's conflation of Aristoxenian and Pythagorean methods, but they also mark a shift in the treatise from the predominantly Aristoxenian material of sections 1–9 to the Pythagorean material of sections 10–16.

The famous story of Pythagoras's discovery of harmonic phenomena while passing by the smithy appears as the centerpiece of Gaudentius's treatise in an account similar though not identical to Nicomachus's *Manuale harmonices* 6.[17] Having reviewed through this story the basic Pythagorean ratios and the means of measuring them on the canon, Gaudentius reminds his readers that the leimma (256:243), while commonly called a semitone, is less than half a tone; the remaining part, also commonly called a semitone, should properly be termed an apotome (2187:2048). Gaudentius does not identify the source of these particular definitions, and they do not appear in any earlier surviving Greek treatise. They do appear, however, in Book III, section 5 of Boethius's *De institutione musica,* where they are specifically attributed to Philolaus. The work of Philolaus was also known to Nicomachus, who refers to it in his *Manuale harmonices* but without including these particular definitions. While the *Manuale harmonices* could not have been Gaudentius's source, there is another possibility: if the first four books of Boethius's *De institutione musica* are indeed an accurate representation of all or part of Nicomachus's lost *De musica,* as has been proposed, Gaudentius might have known and drawn on this other work of Nicomachus for the Pythagorean material in his own treatise.[18]

---

[16] Cassiodorus uses Gaudentius's ratio 24:9 (although the number 9 has been misrepresented as 8 in the manuscript tradition) in describing the interval of an octave-and-a-fourth, and extensions of the Pythagorean pattern to the number 24 appear in later medieval treatises such as the *Scholica enchiriadis*. For a survey of ancient and medieval views of octave-and-a-fourth as a consonance, see Barbera, "Consonant Eleventh," *passim*.

[17] See p. 399 *supra*.

In any case, Gaudentius provides two diagrams of monochord divisions, the first one (section 15) representing the classic Pythagorean scale comprised entirely of 9:8 tones and the leimma, the second (section 16) representing the "intense chromatic genus" comprised of two 9:8 tones of disjunction, both the leimma and the apotome, and a remaining interval in the ratio 32:27.[19]

20736	proslambanomenos
	9:8
18432	hypate hypaton
	256:243
17496	parhypate hypaton
	2187:2048
16384	lichanos hypaton
	32:27
13824	hypate meson
	256:243
13122	parhypate meson
	2187:2048
12288	lichanos meson
	32:27
10368	mese
	9:8
9216	paramese

---

[18] See pp. 391–92 *supra.* In view of Cassiodorus's strong endorsement of Gaudentius's treatise, it is also possible that Boethius may have derived some of his material from Gaudentius.

[19] Neither of these diagrams is actually present in the manuscripts, but Gaudentius's references to the numbers and ratios in the divisions are sufficient to restore them.

	256:243
8748	trite diezeugmenon
	2187:2048
8192	paranete diezeugmenon
	32:27
6912	nete diezeugmenon
	256:243
6561	trite hyperbolaion
	2187:2048
6144	paranete hyperbolaion
	32:27
5184	nete hyperbolaion

This ratio 32:27 is distinctive because it matches the ratio of the upper interval of Archytas's chromatic as described by Ptolemy; the ratios for the two lower intervals in Archytas's chromatic, however, differ from Gaudentius's version.[20] It might be assumed that Gaudentius's division would match Ptolemy's own division for the "intense chromatic," since the phrase is distinctively Ptolemaic, but in fact it does not: Ptolemy's division is 7:6, 12:11, and 22:21. Gaudentius's division very probably represents a traditional chromatic scale in which the two lower intervals exactly comprise a 9:8 tone, with the upper interval containing the balance of the fourth, i.e. 32:27.

In sections 17–19, Gaudentius reverts to an Aristoxenian tone in his discussion of the various species of consonant intervals. He first recalls which notes are stationary and which movable and then defines the various species of the fourth, the fifth, and the octave. His descriptions of the species of the fourth and the fifth largely follow the descriptions found in the Aristoxenian treatises,[21] but when he comes to the description of the species of the octave, he once again reveals himself as a reader of Aristoxenus, not just a mere compiler of excerpts from earlier Aristoxenian treatises. Gaudentius observes that there are actually twelve species because the three species of the fourth and the four species of the fifth can be combined with each other in various ways. Nevertheless, he adds, there are really only seven "melodic and consonant" (ἐμμελῆ καὶ σύμφωνα) species, which are then described not only in terms familiar from the treatise of Cleonides but also in terms of their constituent species of fourth and fifth. The first octave species, for example, is described by Cleonides as extending from hypate hypaton to paramese; it has the tone of disjunction at the top and is known as the Mixolydian. Gaudentius, on the other hand, is unconcerned with the location of the tone of disjunction because he views the octave as comprised of the first species of both the fourth and fifth, with the fourth on the bottom, represented in the pattern extending from the hypate hypaton to the paramese. When Gaudentius reaches the fourth species, the order is reversed: this octave too is comprised of the first species of both the fourth and the fifth, but now with the fifth on the bottom, represented in the pattern extending from the hypate meson to the nete diezeugmenon. As if it were an afterthought, Gaudentius adds at the very end of the section the ethnic names for each octave species.[22]

---

[20] See p. 446 *supra*.

[21] See, for example, p. 380 *supra*.

All this is a very pronounced echo of Aristoxenus: the section of Aristoxenus's *Elementa harmonica* in which he might have considered the species of the octave no longer survives, but in the outline (*Elementa harmonica I*, section I/B/6), Aristoxenus criticizes his predecessors for limiting their examination to seven octave species; earlier, in the *De principiis* (section II/M), Aristoxenus criticized Eratocles's cyclic orderings of the intervals in an octave, deriding this mechanical manipulation because it did not take into account the possible species of the fifth and fourth and the various musical syntheses, which would produce many more than seven species.[23] In addition, Aristoxenus dismisses the ethnic names as deriving from their misapplication to the tonoi by the Harmonicists. Gaudentius could hardly have formed his view of the species of the octave from the treatises of Cleonides, Nicomachus, Theon of Smyrna, or Ptolemy alone; rather, he seems to have based his treatment on Aristoxenus's own writings, supplemented by the later tradition.

Gaudentius turns his attention to musical notation in section 20, beginning with an incisive explanation of the purpose of musical notation and the need for more than a single sign for each note-name (e.g., proslambanomenos, hypate hypaton, etc.). The "musical signs" (σημεῖα μουσικά) were developed, he says, so that the names would not have to be written for each note and in order to indicate the particular pitch of the note, depending upon the tonos. Such a clear statement about notation is not found in any other surviving Greek treatise (though there is perhaps an echo of this in Boethius's *De institutione musica* 4.3), but Gaudentius was aware of other treatises that described the notational system. In observing that each note "can be augmented by as many semitones as there are," he recognized that the statement leaves much unsaid and accordingly added: "but from the diagrams in the Introductions to Music, one could easily learn how the augmenting is signified by the different signs."[24] Gaudentius may have had in mind the type of "wing diagram" included in Aristides Quintilianus's *De musica* or the type of diagram he himself describes in section 22:

---

[22] For an excellent overview of the several theorists' treatments of species, see Barbera, "Octave Species," *passim;* and for a general treatment of the Pythagorean elements in Gaudentius's treatise, see Barbera, "Pythagorean Mathematics," 188–96.

[23] See pp. 309–10 and 333–34.

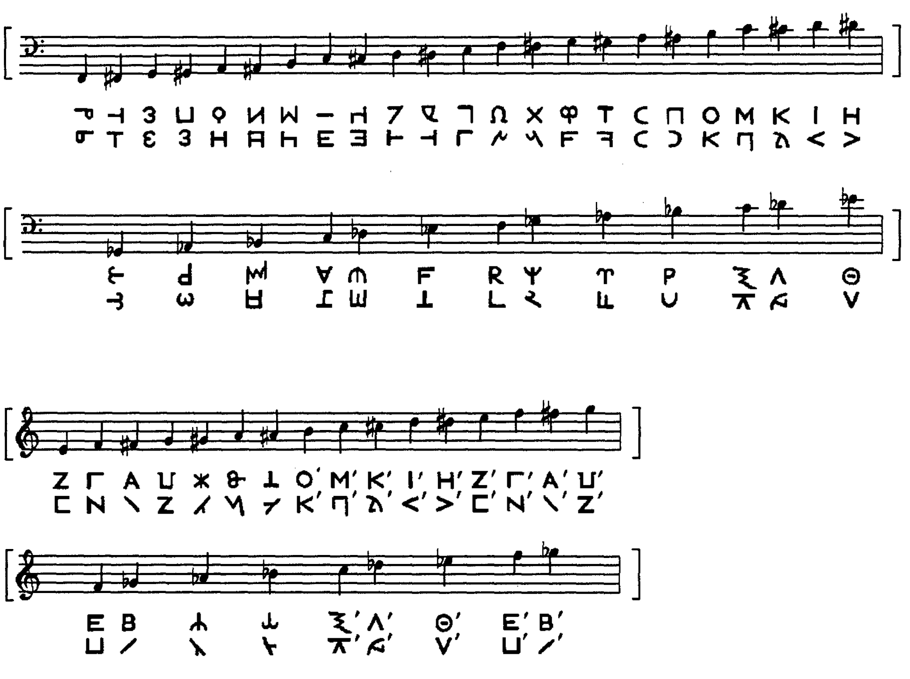


Figure 82.[25]

---

[24] ὅσοις παραυξάνεσθαι δύναται τῶν φθόγγων ἕκαστος ἡμιτονίοις (Jan 348.17–18); τὸ δὲ ὅπως παραυξανόμενος [ἐν] διαφόροις σημείοις ἀποσημαίνεται, ἐκ τῶν διαγραμμάτων ἐν ταῖς μουσικαῖς εἰσαγωγαῖς ῥᾳδίως ἄν τις καταμάθοι (Jan 349.1–4).

[25] The diagram is missing in the manuscripts, but it can easily be restored in accord with the tables preserved in the treatises of Aristides Quintilianus and

In the surviving form of the treatise, Gaudentius does not describe every symbol in the chart, nor does he explain how they were determined; they are simply presented as a set of symbols. In section 21, he refers only to the first three, which are defined as ascending by semitone. The first and second of these can signify only proslambanomenos, but the third could signify either proslambanomenos or hypate hypaton. He explains that the symbols continue until the thirtieth semitonal degree, after which the signs are repeated, beginning from the nineteenth degree ($\overset{\text{O}}{\text{K}}$), with an acute accent added to indicate the higher pitch. Gaudentius also offers the traditional explanation of the pairs of signs as representing the diction (λέξις) and the instrumental accompaniment (κροῦσις)—the two types of notation that have come to be known as vocal and instrumental notation. In addition to the basic set of signs, he mentions a set of "equivalent signs" (ὁμότονα), which at one time were used to represent dieses in the enharmonic and chromatic genera. As he had earlier observed, these genera had fallen into disuse, and so the signs came to be used simply as indifferent alternatives for their parallel sets. Once again, he refers to other theoretical treatments of notation: "There is comment on them in the Introductions."[26]

In section 22, Gaudentius probably described each of the signs in the chart, but only the first six (and their equivalents) remain. Each "description" refers to a letter of the alphabet or an accent and any modification that may have been applied to it. For example, the first pair is described as "half-phi on its side and reversed half-phi" (τὸ ἡμίφι πλάγιον καὶ ἡμίφι ἀπεστραμμένον), the third as "reversed double sigma and double sigma" (σίγμα διπλοῦν ἀπεστραμμένον καὶ σίγμα διπλοῦν), the fifth as "omicron with a downward stroke and eta" (ου κάτω γραμμὴν ἔχον καὶ η), and so on. The treatise closes with four tables showing the notational signs in the diatonic genus for the Hypolydian, Hyperlydian, Aeolian, and Hypoaeolian tonoi, the last of which breaks off in the middle. It is probable that the missing descriptions of the other signs and a table for the Lydian tonos preceded the table for the Hypolydian tonos. Likewise, it is reasonable to assume that the

---

Alypius (see pp. 599 *infra*). The conventional pitches are shown in brackets above the Greek symbols. See Mathiesen, "Gaudentius," 81–85.

[26] εἴρηται δὲ περὶ αὐτῶν ἐν ταῖς εἰσαγωγαῖς (Jan 350.17–18).

table for the Hypoaeolian tonos, originally complete, was followed by tables for the ten additional tonoi, including the two added by the "younger theorists."[27]

Although Gaudentius's treatise is truncated in the middle of the table of the Hypoaeolian tonos, as the treatises survive today, only the tables of Alypius—an author also mentioned by Cassiodorus—provide a more complete representation of ancient Greek notation.[28] In Alypius's treatise, tables were clearly intended for each of the fifteen tonoi in each genus; it is doubtful, though not impossible, that Gaudentius originally included tables for any genus other than the diatonic.

The consistency of the notational symbols as they appear in surviving pieces of Greek music and in the treatise of Gaudentius—not to mention Alypius, Aristides Quintilianus, and Bacchius Geron, who will be discussed later in this chapter—attests to the importance of musical notation in antiquity. One might wish Gaudentius had provided a fuller explanation of the origin and development of the notational system, as well as comment on interpretation and performance practice, but those are matters that could hardly have been of interest to an author of his time. While Gaudentius seems to have been a close reader of earlier Greek music theory and indeed to have known a number of treatises no longer extant, his was a scholastic tradition concerned with the preservation of an archaic culture, not with historical or aesthetic analysis.

Gaudentius must have been known throughout the Middle Ages only as an tantalizing shadow in the references of Cassiodorus. Despite Cassiodorus's early praise of this treatise, it was preserved in a comparatively small number of manuscripts. In the sixteenth century, however, the treatise was known to Giovanni Del Lago, Gioseffo Zarlino (*Istitutioni harmoniche* 3.5), Girolamo Mei, Francisco Salinas (*De musica* 2.9), and others.[29]

Porphyrius

In keeping with their historical and scholastic interests, authors such as Plutarch (and the author of the Plutarchean *De*

---

[27] See pp. 385–87 *supra* and 599 *infra*.

[28] See pp. 596–605 *infra*.

[29] See Bonnie J. Blackburn, Edward E. Lowinsky, and Clement Miller, eds., *A Correspondence of Renaissance Musicians* (Oxford: Clarendon, 1991), document 96.

musica), Athenaeus, Theon of Smyrna, and others writing during the second, third, and fourth centuries C.E. regularly included in their own works quotations or paraphrases drawn from earlier authors, sometimes as the basis for comment, sometimes with the intent of presenting an important literary document for its own sake, and sometimes, it would seem, simply for literary effect. The later authors' works themselves, however, are intended to stand as original treatments of their subjects. The specific literary forms of the epitome and the commentary, by contrast, are intended to stand together with the earlier works on which they are based. Both these forms enjoyed considerable popularity during this same period and provided alternative means through which authors could display their historical and scholastic interests.

Epitomes are generally related to an explicit earlier source, although a work such as Cleonides's *Harmonica introductio*, which may be an epitome of Aristoxenus's *Harmonica*, is not formally predicated on the earlier treatise. In any case, by its nature as a self-contained work, an epitome could stand alone, if necessary. Commentaries, however, by their nature address a specific earlier source and were never intended to stand alone. Porphyrius's extended discussion of Ptolemy's *Harmonica*, for example, represents a true commentary in which various passages from an earlier work, specifically identified, are excerpted to provide a basis for further excurses, often involving extended quotations from other early works, and for explanation and analysis. While a commentary is not primarily original, it may well preserve material attributed to earlier authors, otherwise unknown. In historical terms, these epitomes and commentaries are of particular importance because they were read frequently in later centuries, sometimes in place of the earlier texts to which they are related. Indeed, this type of work, together with the compilation, would enjoy a popularity far into the Middle Ages, providing readers at least faint connection with the literature of the past.[30]

Much of the important material preserved in Porphyrius's *In Ptolemaei Harmonica commentarium*, the sole example of a pure commentary on a Greek musical treatise, has already been introduced in earlier chapters of this book.[31] Nevertheless, the commentary as a whole deserves some consideration as the unique example of this particular literary form in the field of ancient Greek music theory.

---

[30] As Reynolds and Wilson note (*Scribes and Scholars*, 250), "there is still much to be written on the scholiasts and grammarians of late antiquity." See also *Scribes and Scholars*, 31–33.

Porphyrius (232/3–ca. 305 C.E.) was born of Syrian parentage at Tyre, where he was named Malkos. He studied first in Athens with Longinus (ca. 213–273 C.E.) and then went to Rome in 263, where he joined the school of Plotinus (205–270 C.E.) for six years. He sojourned for a time in Sicily and, at Plotinus's request, promised to organize and edit his master's teachings. From his time in Rome, Porphyrius already possessed forty-five of Plotinus's individual "treatises"; the final nine were sent to him by Plotinus himself in 269 and 270. After Plotinus's death, Porphyrius returned and fulfilled his promise by arranging the fifty-four "treatises" into six sets of nine, which he accordingly called *Enneades*.[32] In this form, Plotinus's neo-Platonic philosophy enjoyed a wide circulation and came to have a lasting influence.

Porphyrius himself was a prolific writer whose work ranged from introductions and commentaries on Plato and Aristotle to metaphysics, the history of philosophy, the various religions of his day, literary criticism (including allegorical interpretations of Homer), and technical works on grammar, rhetoric, and medicine. These works include his famous refutations of Christianity (destroyed in 448 under Theodosius II) and the Book of Zoroaster, a life of Pythagoras, and the *Isagoge*, which had a profound influence on medieval logic through the Latin translations of Marius Victorinus and Boethius. Many of the surviving writings are doubtless fragments of larger works.

Porphyrius's *In Ptolemaei Harmonica commentarium* is preserved in seventy-one codices, which represent two basic forms of the commentary, one of them extending only through chapter 4 of Book I of Ptolemy's *Harmonica*, the other extending through chapter 7 of Book II. In his 1932 edition of the commentary,[33]

---

[31] See pp. 3, 9, 10, 28, 160, 182–83, 186, 226–27, 288–89, 292, 294–97, 334–35, 340, 345–47, 349, 353, 375, 401, 430, 433, 439, and 457 (n. 185) *supra*.

[32] Most of these details are derived from Porphyrius's own "Life of Plotinus and the Order of His Books" (for a text and translation, see *Plotinus in Seven Volumes*, ed. and trans. A. H. Armstrong, Loeb Classical Library [Cambridge: Harvard University Press, 1966–88], 1:2–85).

[33] See chapter 1, n. 20 *supra*.

Ingemar Düring arranged his manuscripts into four classes: **m**, which he considered to represent the earliest surviving version of the commentary, that is, the one extending only through chapter 4 of Book I; **g**, representing the text critical work of Gregoras, perhaps based on some manuscript of the **m** class that contained the commentary extending through chapter 7 of Book II; **A**, a version completed by Isaac Argyros;[34] and **h**, a shortened synopsis of the commentary arranged in one hundred excerpts.[35]

The earliest codex containing the commentary is Venetus Marcianus gr. app. cl. VI/10, the primary exponent of Düring's **m** class, just as it was for his **m** class of Ptolemy's *Harmonica*.[36] Fifteen codices fit within this class.[37] In three additional codices, the commentary for chapters 1–4 of Book I is set out in a separate section, just as in the other fifteen codices, but the balance of the commentary through chapter 7 of Book II then appears in two following sections. Two of these codices, Parisinus Supplementarius gr. 449 and Vaticanus gr. 176, represent the version of the commentary prepared by Isaac Argyros (Düring's **A** class), in which the author of the two following sections is erroneously identified as Pappus. The third codex, Parisinus gr. 2454, represents an example of the way in which sixteenth-century scribes often completed texts they regarded as fragmentary by adding material from parallel manuscripts. In this codex, the commentary for chapters 1–4, ending on f. 59v, has been extensively collated by a second but contemporary hand; following three blank folios, the second hand adds the balance of the commentary derived from a manuscript of the **g** class.[38]

---

[34] Gregoras and Argyros also prepared versions of Ptolemy's *Harmonica;* see p. 431 *supra.* For a complete list of editions and translations, see the Bibliography under "Porphyrius."

[35] The synopsis is preserved in only seven manuscripts, described in Mathiesen, *RISM B/XI,* **107, 175, 125, 195, 204, 230,** and **242.** According to Düring, it was also preserved in Hamburgensis inter phil. 87, but this manuscript has been missing since the end of World War II. The version preserved in Parisinus Supplementarius gr. 59 (**107**), unlike the other versions, also includes the preface to the commentary.

[36] See p. 432 *supra.*

[37] These manuscripts are described in Mathiesen, *RISM B/XI,* **5, 20, 34, 80, 163, 170, 197, 200, 210, 219, 238, 255, 256, 263, 273.** Düring would also include **111, 202, 211,** but this is erroneous: **111** is a seventeenth-century collection of notes and transcriptions by Ismael Bouillaud, containing only a small portion of the commentary copied from **80**; **202** contains only the preface to the commentary; and **211** includes the commentary for all of Book I, but not for Book II.

Düring based his **g** class on Vaticanus gr. 198, here again the same codex he used for the **g** class of Ptolemy's *Harmonica*.[39] Forty-two codices include the longer version of the commentary, generally divided into two parts, the first for Book I, and the second for chapters 1–7 of Book II. For the most part, these include the various chapter headings and excerpts from Ptolemy's treatise to assist the reader in following the commentary, but some significant variants do appear.[40]

From this conflicting evidence, it is impossible to determine whether Porphyrius completed a commentary on all of the *Harmonica;* why the commentary on the first four chapters (the **m** class) is so much more detailed and prolix than the commentary extending from chapter 5 of Book I through chapter 7 of Book II (found in the **g**-class manuscripts); why this earlier part of the commentary might have become separated from the rest; and whether Porphyrius himself was in fact responsible for the additional material represented in the **g**-class manuscripts. It cannot be simply assumed that the commentary as it has come to be known in modern editions represents a finished or complete work.[41]

In any event, the primary purpose of the commentary seems to have been the assessment of Ptolemy's theoretical position and the identification and quotation of earlier sources that Ptolemy failed to acknowledge, which might bolster or refute his arguments. Thus, it is quite different from all the other treatises that have come to comprise the corpus of ancient Greek music theory. Indeed, the commentary is not particularly interested in the technical material of chapters 4–16 of Book I and chapters 1–7 of Book II of the *Harmonica;* it concentrates instead on the basic principles of harmonic and acoustic theory as well as on assigning Ptolemy a theoretical position between Pythagoras and Aristoxenus. Little or nothing here has not already been fully explored in the earlier treatises.

---

[38] See descriptions in Mathiesen, *RISM B/XI*, **83** (the balance of the commentary added in a second hand); and **114** and **208** (the balance of the commentary added under the name of Pappus).

[39] See p. 433 *supra.*

[40] The codices in this group also exhibit significant lacunae, and in one instance (Escorialensis gr. 556 [Ω.IV.4]), the text is falsely attributed to Theon of Alexandria. Two codices in this group, Cantabrigiensis Trinitatis gr. 1308 (O.5.27) and Upsaliensis gr. 52 (see Mathiesen, *RISM B/XI*, **119** and **294**), were unknown to Düring. He includes Oxoniensis Collegii Universitatis gr. 140 (**149**) in this group, but I have not counted it among the forty-two because it actually includes only a fragment of the commentary.

[41] Bengt Alexanderson (*Textual Remarks on Ptolemy's Harmonica and Porphyry's Commentary*, Studia graeca et latina Gothoburgensia, no. 27 [Göteborg: Universitet, 1969], 6) observes "... I am aware that still many problems remain. Especially the text of Porphyry seems to me to be in a worse state than Düring thought."

The commentary is addressed to a certain Eudoxius, and its primary value, even in its own day, was almost certainly the inclusion of quotations drawn from earlier literature. The most extensive of the quotations preserves the Aristotelian *De audibilibus,* which contains a good deal of information on the nature of sound and the various causes of different types of sounds, whether found in the voice or in instruments.[42] The commentary also includes a substantial quotation of the *Sectio canonis;* fragments attributed to Archytas; passages from the writings of Aristotle, Aristoxenus, and Thrasyllus,[43] among others; and extended quotations from otherwise unknown works by Ptolemaïs (a study on the Pythagorean elements in music), Didymus (a comparison of the Pythagorean and Aristoxenian theories of music), Heraclides (an introduction to music), Aelian (a commentary on the *Timaeus*), Theophrastus (a work on music), and Panaetius (a treatment of the ratios and intervals in geometry and music). Much of the material in these unknown works also appears elsewhere, but the way in which Porphyrius relates it to passages in Ptolemy's *Harmonica* is of some interest.[44]

---

[42] This treatise has been considered in chapters 3 and 5. See pp. 160, 185–86, 198, 202–4, 211, 215–16, 233, 397, and 438–39 *supra.*

[43] On the *Sectio canonis,* see chapter 4, p. 346; on Archytas's Fragment 1, see chapter 3, pp. 172–73 and 183 *supra;* Archytas's Fragment 2 provides his definition of the three means: arithmetic, geometric, and harmonic (on these, see chapter 5, pp. 362–63, 400–401, 422, and 426–27 *supra*); on Porphyrius and Aristoxenus, see chapter 4, pp. 295–97 and 334–40 *supra;* and on Thrasyllus, see chapter 5, pp. 391, 412, 417, 422–24 *supra* (Porphyrius's excerpts from Thrasyllus are very brief and merely provide additional definition of intervals).

[44] Apart from Düring's edition of the commentary, the fullest studies are Boll, *Studien über Claudius Ptolemäus;* and Schönberger, *Studien zum 1. Buch der Harmonik des Claudius Ptolemäus* (see chapter 5, n. 145 *supra*).

The quotations drawn from the work of Ptolemaïs of Cyrene and Didymus[45] are presented by Porphyrius in immediate succession as he comments on three passages drawn from the second chapter of the first book of the *Harmonica*. In the first passage, Ptolemy has defined the "harmonic canon" as an instrument used by students of harmonics to make precise measurements that can be used to correct the perceptual deficiencies of senses.[46] Porphyrius offers some preliminary terminological comments about the "canon" and "canonics" and then introduces Ptolemaïs's remarks found in her *Pythagorean Elements of Music* (ἐν τῇ Πυθαγορικῇ τῆς μουσικῆς στοιχειώσει), which is set out as a kind of catechism with questions leading to a series of straightforward explanations.[47] Here, she explains that "canonics," a term associated primarily with the Pythagoreans, is equivalent to the more modern term "harmonics." Since canonics was concerned with the rational discovery of the basic harmonic ratios, the preeminent instrument on which these could be demonstrated came to the called a "canon," although the aulos and syrinx were also employed in canonics. Thus, a Canonicist is distinct from a Musician because the former takes ratio as a point of departure while the latter takes perception; in a larger sense, though, both are "Musicians." Canonics is related both to music and to mathematics: to music in its interest in defining such things as the various types and sizes of intervals; and to mathematics in its ability to show that such musical elements as notes and intervals are actually based on number.[48]

The second passage drawn from the *Harmonica* pertains to Ptolemy's assertion that in a proper theory, the evidence of the senses and the evidence of reason will accord, even though their judgments apply to different aspects.[49] This is an unusual position, as Porphyrius underscores with a second excerpt from Ptolemaïs. She observes that while the Pythagoreans are willing to accept the evidence of the senses as a "guide for reason" (ὁδηγὸς τοῦ λόγου), reason alone takes priority whenever it fails to accord with the senses. The Musicians who follow Aristoxenus, by contrast, rely on their instruments and sensory perception, which often fail to accord with principles of canonics. Although Porphyrius makes no comment on this characterization, it is significant that Ptolemaïs distinguishes Aristoxenus himself, who would certainly not have regarded instruments as a suitable ground for judgment,[50] from the Musicians who follow him.

---

[45] Nothing at all is known of Ptolemaïs except that she is a woman (which is determined only by the gender of the Greek; Porphyrius makes no comment on the matter); on Didymus, identified by Ptolemy with the cognomen "the musician," see chapter 5, n. 185 *supra*.

[46] See chapter 5, p. 438 *supra*.

[47] This characteristic is also found in the treatise of Bacchius Geron. See pp. 583–93 *infra*.

[48] It is not always possible to tell where Porphyrius's quotations end. In his edition, Düring tends toward viewing the quotations as only short passages followed by Porphyrius's development or gloss of the material; in his translation of most of the longer excerpts (*Greek Musical Writings*, 2:229–44), Barker sometimes ignores Düring's terminal quotation marks and takes all the material as if it came from the earlier source.

The final passage pertains to the balance of *Harmonica* 1.2, in which Ptolemy points out that both the Pythagoreans and the Aristoxenians are mistaken in their positions, promising to explain the problems more fully as he proceeds.[51] For comment, Porphyrius contents himself with a final quotation from Ptolemaïs and two passages from Didymus. Ptolemaïs's excerpt basically repeats the passage Porphyrius had quoted only a few lines earlier, but with the significant addition that Aristoxenus himself regarded both reason and the evidence of the senses as inextricably linked. She observes, correctly, that for Aristoxenus the evidence of the senses cannot establish anything without reason, but neither is reason sufficient to establish anything without taking the evidence of the senses as a point of departure. Thus, sensory perception leads in order, while reason leads in power.[52]

Didymus confirms Ptolemaïs's characterization of Aristoxenus's position, while also adding further detail to the distinctions drawn between the groups favoring either reason or sensory perception. According to Didymus, those who favor sensory perception are instrumentalists (ὀργανικοί) and vocalists (φωνασκικοί), who rely primarily on habituation (συνήθεια), while those who favor reason are, of course, the Pythagoreans.[53]

---

[49] See chapter 5, p. 438 *supra.*

[50] Aristoxenus *Elementa harmonica I* (I/B/10); see chapter 4, pp. 319 and 323–24 *supra.*

[51] See chapter 5, p. 438 *supra.*

[52] Aristoxenus *Elementa harmonica I* (I/B/2); see chapter 4, pp. 314 and (especially) 321–24 *supra.*

Chapter 3 of the first book of Ptolemy's *Harmonica* deals with the establishment of height and depth with regard to sounds. Ptolemy avoided the descriptions of sounds and notes appearing in many of the Aristoxenian treatises, exploring instead some of the reasons for such sonic qualities as smooth and rough, loud and soft, light and forceful.[54] The commentary on this chapter includes the whole of the Aristotelian *De audibilibus*, the larger of the two quotations from Aelian's commentary on the *Timaeus*, Theophrastus's work on music, and the excerpts from Heraclides's introduction to music and Panaetius's work on the ratios and intervals in geometry. With all this material, Porphyrius develops a rich context within which to view Ptolemy's concern with both the quantitative and qualitative aspects of musical sound.

Porphyrius begins by affirming that the Pythagoreans regarded height and depth of sounds as matters of quantity, not quality. In support, he introduces Heraclides,[55] who describes in his *Musical Introduction* (ἐν τῇ Μουσικῇ εἰσαγωγῇ) how the Pythagoreans discovered that musical intervals are a blending of quantities. Each sound, according to their view, is made up a of certain quantity of percussion (πληγή),[56] which occurs so rapidly that the ear is not aware of the individual pulsations but only of a continuous sound. This is rather like the effect produced by a single spot of color on a whirling cone: as the cone spins, the eye is no longer aware of the individual spot but sees instead a circle surrounding the cone.

---

[53] In the **m**- and **g**-class manuscripts, the two passages from the treatise of Didymus are separated by a demonstration of the ways in which sense and reason might perceive the three types of notes in a pycnon. Düring (*Ptolemaios*, 145–49) thinks this is a glossed quotation from Archestratus, introduced by the final words in the first passage of Didymus: "And there are others who give a place to both sense and reason, although they give a sort of privilege to reason; Archestratus is of this group" (ἄλλοι δ' εἰσίν, οἳ ἀμφότερα μὲν τιθέασιν αἴσθησίν τε καὶ λόγον, ἤδη δὲ τῷ λόγῳ προνομίαν τινὰ ἀποδιδόασιν, ὧν ἐστι καὶ Ἀρχέστρατος [Düring, 26.27–29]). Argyros, however, joined the two Didymus passages in his edition (the **A** class), eliminating altogether the interpolation, which he must have regarded as suspect. It certainly interrupts the argument of Didymus, and the two passages make much more sense without the interpolation.

[54] See chapter 5, pp. 438–39 *supra*.

[55] This is perhaps Heraclides Ponticus the Younger, who studied at Alexandria with the famous Didymus of Alexandria and later taught in Rome during the time of Claudius and Nero. It is barely possible that Heraclides was the father of Didymus "the musician" (see n. 45 *supra*). Heraclides's excerpt is translated in Barker, *Greek Musical Writings*, 2:235–36.

[56] This recalls the beginning of the *Sectio canonis*; see chapter 4, pp. 346–47 *supra*.

After bolstering this quantitative position with short passages drawn from Archytas and Democritus, Porphyrius introduces a long quotation from Aelian's commentary on the *Timaeus* (εἰς τὸν Τίμαιον), which provides various examples of the quantitative relationship of sounds in musical instruments.[57]

Both Ptolemy and Porphyrius were aware of the limitations in classing sounds only by number and recognized that sounds also have a qualitative dimension. Porphyrius provides considerable elaboration of his own on this point, with brief passages drawn from Aristotle's *Categoriae* and *De anima,* but when he comes to the point at the end of chapter 3 where an analogy is drawn between the vocal windpipe (ἀρτηρία) and the aulos, he turns to three long quotations from Theophrastus, Panaetius, and the Aristotelian *De audibilibus.*

Theophrastus begins by insisting on a distinction between notes as they function within a musical complex and as they might be viewed in simple quantitative terms. He recognizes that the quantitative aspect—that is, the number of pulsations that may produce a certain pitch or other ways in which pitches might be assigned certain numbers so that the ratios between them can be compared—is not without value, but he maintains that if notes were **only** number, then anything else that partakes of numbers, such as various colors, might also be part of a melos. On the other hand, if number is simply an attribute or characteristic of notes, the notes themselves may have other intrinsic differences. Theophrastus asserts that the quantities assigned to notes are entirely relative, and as examples to support his argument, he observes that in musical instruments, such additional quantities as the relative thickness and tension of strings and the force of breath required to produce a vocal tone or pitch on the aulos will be inversely related to other numerical quantities associated with high and low pitch.[58] Likewise, the intervals themselves, in all their various sizes, are not the basis of melos, because if one or more intervals were removed, the pitches that can be organized into a melos would still remain. Theophrastus accordingly concludes that "music has but one nature: the motion of the soul that arises from the release of evils brought about by the passions; if there were not this motion, there would be no nature of music."[59] This conclusion anticipates Aristides Quintilianus's emphasis on music as a means of freeing the soul from the passions, both of which may hearken back to the theories of Damon.[60]

---

[57] This material has been discussed in chapter 3, pp. 186–87, 196–97, and 216; chapter 5, pp. 375, n. 36, and 401, n. 84 *supra.*

Porphyrius immediately follows the excerpt from Theophrastus with a shorter passage drawn from *On the Ratios and Intervals in Geometry and Music* (περὶ τῶν κατὰ γεωμετρίαν καὶ μουσικὴν λόγων καὶ διαστημάτων) by Panaetius the Younger,[61] in which he explains that while consonant intervals are typically described by mathematicians in terms of ratios, the quantitative relationships underlie but do not constitute the characteristic quality of the interval. Moreover, while the mathematical relationships discovered on the canon enable specification of the various intervals, the numbers in the ratio do not individually represent or describe the notes in an interval; rather they represent the objects that produce the notes—an important distinction. Finally, Panaetius adds the familiar objection to the notion that an interval in the ratio 9:8 can be divided in half.

---

[58] Along the way, Theophrastus also notes the acoustic phenomenon that high pitches are highly directional, while low pitches are not, as well as noting some of the characteristics of resonance in musical instruments. On Theophrastus and the aulos, see chapter 3, pp. 198–218 *supra*.

[59] μία δὲ φύσις τῆς μουσικῆς· κίνησις τῆς ψυχῆς ἡ κατ' ἀπόλυσιν γινομένη τῶν διὰ τὰ πάθη κακῶν, ἣ εἰ μὴ ἦν, οὐδ' ἂν ἡ τῆς μουσικῆς φύσις ἦν (Düring, 65.13–15). A translation of the full excerpt appears in Barker, *Greek Musical Writings*, 2:111–18; but see also Alexanderson, *Textual Remarks*, 32–40.

[60] For example, in *De musica* 2.6–7 and 3.25. See pp. 545–48 and 576–78 *infra*. An extended treatment of this fragment is provided by Edward A. Lippman, *Musical Thought in Ancient Greece* (New York: Columbia University Press, 1964; reprint, New York: Da Capo, 1975), 157–66; Andrew Barker, "Music and Mathematics: Theophrastus against the Number-Theorists," *Proceedings of the Cambridge Philological Society* 23 (1977): 1–15; and idem, "Theophrastus on Pitch and Melody," in *Theophrastus of Eresus*, ed. W. Fortenbaugh *et al.* (New Brunswick: Transaction Books, 1985), 289–324.

[61] This author is otherwise unknown.

The commentary on chapter 3 closes with a lengthy quotation from the Aristotelian *De audibilibus*.[62] Porphyrius includes this passage because by drawing many parallels between the human voice and musical instruments, it complements the same parallels drawn by Ptolemy between the windpipe and the aulos.

With the exception of the extended quotation from the *Sectio canonis* in the commentary to chapter 5,[63] most of the balance of Porphyrius's commentary is little more than a gloss on Ptolemy's text, and in fact the glosses become progressively shorter until the end of Book I. In the commentary to Book II, only the names of Plato and Aristotle are even mentioned (apart from Ptolemy's name, of course), and the material, while still presented in the form of a commentary, is essentially an epitome of Ptolemy's text.

Unlike the treatises of Cleonides, Ptolemy, Gaudentius, and Alypius, all of which are mentioned by Cassiodorus, Porphyrius's commentary does not seem to have been known by any musical writer in the Middle Ages, with the possible exception of Manuel Bryennius; although he never mentions Porphyrius by name, he may have made use of the commentary for some of the sources quoted in his own *Harmonica*. If Porphyrius's commentary—in whatever form—was known at all to medieval readers, they would surely have been discouraged by its prolixity and lack of any immediate appeal in either technical or literary terms. As an entirely anomalous work in the context of the other Greek writings on music, Porphyrius's work simply faded from view until its value as a treasury of source material was recognized in the writings of Carlo Valgulio (fl. 1480–1509), Giorgio Valla (1447–1499), and Franchino Gaffurio (1451–1522).[64]

---

[62] The *De audibilibus* was discussed earlier in chapters 3 and 5 (see n. 42 *supra*). The treatise and its possible authority are discussed by Gottschalk, "The *De audibilibus* and Peripatetic Acoustics" (see chapter 4, n. 1); Barker, *Greek Musical Writings*, 2:99–109, provides an English translation; for reference to an alternative translation, see chapter 3, n. 65 *supra*.

[63] On the *Sectio canonis*, see chapter 4, p. 346 *supra*.

[64] For example, in Valgulio's *Prooemium in musicam Plutarchi ad Titum Pyrrhinum* (Brescia: Angelo Britannico, 1507); Valla's *De expetendis et fugiendis rerum opus* (Venice: Aldo Romano, 1501), book II, chapter 4; and Gaffurio's *Theorica musice* (Milan: Ioannes Petrus de Lomatio, 1492), ff. avi^{v} and aviii^{r}; and idem, *De harmonia musicorum instrumentorum opus* (Milan: Gotardus Pontanus, 1518), ff. XVIr, XXv, and LXIv. See Palisca, *Humanism*, chapters 4–5.

Aristides Quintilianus

The scholastic tradition of late antiquity is dominant in the treatises of Gaudentius, Bacchius Geron, and Alypius, but it was not the only intellectual tradition of the time. The rise of neo-Platonism in the third century, especially as expressed in the writings of Plotinus, led to a renewed interest in elaborate philosophical discourse, encompassing the allegorical, ethical, and metaphysical properties of music. To some extent, this interest was already apparent in the treatises of Nicomachus and Theon of Smyrna, and especially in the final part of Book III of Ptolemy's *Harmonica*, but none of these authors attempted to show how each element of harmonics, rhythmics, and metrics might be viewed as a grand paradigm for the overarching soul of the universe. This was the task Aristides Quintilianus set for himself.[65]

There has been considerable debate about Aristides Quintilianus's identity and *floruit*, but the outer limits within which his treatise *De musica* could have been written are clearly defined: in Book II, Aristides Quintilianus refers to Cicero, who died in 43 B.C.E.; and a substantial section of Book I is appropriated by Martianus Capella in the ninth book of his *De nuptiis Mercurii et Philologiae*, composed between 410 and 439 C.E. Aristides Quintilianus's treatise must therefore date no earlier than the first century B.C.E. and no later than the fourth century C.E.

Various arguments have been advanced for dating the treatise to the first or second centuries C.E. For instance, in some of the manuscript sources for the treatise, the author's name is given as 'Αριστείδου κοιντιλιανοῦ, while in others, it appears as 'Αριστείδου τοῦ κοιντιλιανοῦ. The latter form, considered together with Aristides Quintilianus's emphasis on rhetoric and grammar, led to the supposition that Aristides might be the son or freedman of M. Fabius Quintilianus (ca. 30/35–ca. 95 C.E.), the author of the *Institutio oratoria*. As other alternatives, both the Christian apologist Marcianus Aristides, who lived during the reign of Hadrian (117–138 C.E.), and Aelius Aristides (117 or 129–ca. 181 C.E.) have been proposed as identities for Aristides Quintilianus, largely on the basis of similar interests in metaphysics and medicine and the similarity of names, but the arguments are not persuasive.

---

[65] Much of the following treatment of Aristides Quintilianus and his treatise originally appeared in Mathiesen, *AQ on Music*, 1–57 *et passim*.

It has also been noted that although Aristides Quintilianus mentions many names in his treatise, he does not refer to Claudius Ptolemy, who of course wrote his own extensive treatment of ancient Greek music theory arranged in three books. Since Aristides Quintilianus states that he wrote his treatise because there was no other complete and systematic treatment of the subject and he does not seem to be aware of Ptolemy's tonoi, it has been proposed that Aristides Quintilianus must predate Ptolemy.[66] But there are several other possible explanations: if Aristides Quintilianus did know the *Harmonica* of Ptolemy, he may still have considered that his treatise offered a different type of systematic treatment, since in fact it is conceptually and inherently quite different from Ptolemy's treatise, or he may have deliberately misrepresented it to promote his own treatise; he knew only the incomplete version of Ptolemy's treatise,[67] or his knowledge of it was limited to Porphyrius's commentary, which in its longest form extends only through Book II, chapter 7; or he simply did not know Ptolemy's *Harmonica* at all.

In any event, the contents of the treatise itself make a date in the first or second century C.E. unlikely. At the very beginning of the treatise (*De musica* 1.1), Aristides Quintilianus addresses his friends Eusebius and Florentius, typical Christian names that are not found in Greek literature prior to the third century. While it has been tacitly assumed that such an address was merely a literary device, in fact there are numerous letters written to Antiochenes named Eusebius and Florentius between 355 and 393 by Libanius of Antioch (314–ca. 393 C.E.), influential rhetorician and literary figure. In a letter of 357 to Aristainetus (Ep. 591), Libanius refers to an admired fellow citizen Mariades, whom he characterizes as a rhetorician, agreeing that Aristainetus rightly calls him Aristides. Thus, a Eusebius, a Florentius, and the rhetorician Aristides were all located in Antioch and connected to one another in the mid-fourth century through Libanius.[68] Moreover, in conservatism, antiquarian interests, and stylistic terms, there are numerous similarities between the writings of Libanius and Aristides

---

[66] Meibom, *Antiquae musicae auctores septem,* 2:[iv] and 235, concluded that Aristides Quintilianus was a contemporary of Plutarch.

[67] See pp. 431–33 *supra.*

[68] L. Zanoncelli, "La filosofia musicale di Aristide Quintiliano," *Quaderni urbinati di cultura classica* 24 (1977): 91–93.

Quintilianus. The overall vocabulary and style of *De musica* are decidedly neo-Platonic, reflecting or at least suggesting specific passages in the *Enneades* of Plotinus, the writings of Porphyrius, and the *De communi mathematica scientia* and *De mysteriis* of Iamblichus (ca. 250–ca. 325 C.E.): noteworthy examples are the invocation (Book I, section 3), the several sections dealing with the soul (especially Book II, sections 2, 8, and 17; and Book III, sections 7 and 25–27), the differentiation between the sublunar and ethereal regions (Book II, sections 17 and 19; Book III, sections 7, 12, and 20), and references to the Mysteries (Book III, sections 21 and 27). An especially telling example appears near the end of Aristides Quintilianus's treatise (Book III, section 27), where he refers to the doctrine of the soul's escape from the cycle of reincarnations through the power of philosophy, a doctrine associated especially with Porphyrius rather than with Plotinus. Aristides Quintilianus also refers to the "helicon" (Book III, section 3), first described by Claudius Ptolemy (Book II, chapter 2) and explained at greater length by Porphyrius in his commentary; Aristides Quintilianus comments on "those who" use this type of canon to demonstrate the various harmonic consonances, thereby making it clear that his description is derived from an earlier, albeit unidentified source.

Although the treatise shows strong evidence of third- and fourth-century literature, it is certainly true that neo-Platonic and neo-Pythagorean themes pre-date Plotinus, Porphyrius, and Iamblichus. As has already been noted, Nicomachus's *Manuale harmonices,* chapter 3 and Ptolemy's *Harmonica* Book III relate music and Platonic or Pythagorean cosmology. Their treatments, however, are very different from Aristides Quintilianus's treatise, and it cannot be determined whether Aristides Quintilianus knew these particular works. It is almost certain that he did draw on such second-century authors as Theon of Smyrna, Ptolemy, Plutarch, and Hephaestion. Parallels can also be found with the treatises of Cleonides, Gaudentius, and Bacchius, but as their dates are not beyond question, they offer no positive evidence in dating Aristides Quintilianus.

Aristides Quintilianus remains unmentioned by name in any datable source earlier than Martianus Capella, or indeed in any early source at all, with a single exception: his name appears in connection with a passage from *De musica* 1.5 cited in a scholion περὶ προσῳδίας, which is ascribed to Porphyrius in a number of manuscripts;[69] the scholion also appears, but without the attribution to Porphyrius, in Vaticanus gr. 14, a manuscript of the thirteenth century. If this scholion were indeed written by the neo-Platonist Porphyrius, it would place Aristides Quintilianus between Plotinus and Porphyrius or perhaps as a contemporary of Porphyrius in the late third century. The scholion, however, is also ascribed to George Choeroboscus (fl. 8th century C.E.) in at least one manuscript,[70] and as Choeroboscus was a grammarian, this attribution may well be correct. In this case, it would not add to the limitation of Aristides Quintilianus's *floruit* already provided by Martianus Capella.

Taken as a whole, the evidence supports a *floruit* in the late third or early fourth century C.E., more or less contemporary with Gaudentius. Within this range, however, it is not possible to place a more precise date on the composition of the treatise itself.

Aristides Quintilianus's *De musica* is preserved complete in fifty-six manuscripts, the earliest of which are the twelfth-century Venetus Marcianus gr. app. cl. VI/10 and the thirteenth-century Vaticanus gr. 192, both of which have already been encountered as the earliest sources for the treatise of Ptolemy.[71] The Venetian manuscript also contains the commentary of Porphyrius, the Plutarchean *De musica,* the treatises of Bacchius and Dionysius, and the so-called Bellermann's Anonymous, while the Vatican codex is a composite of three earlier manuscripts containing a wide range of scientific texts on music, geometry, optics, and astronomy. Substantial excerpts from Aristides Quintilianus's *De musica* appear in nine other manuscripts,[72] and part of the treatise is embedded in the treatise of Cleonides in six additional manuscripts.[73]

---

[69] Oxoniensis Bodleianus Baroccianus gr. 116 (14th century), from which numerous other manuscripts were copied.

[70] Hauniensis gr. 1965. On this scholion, see Alfred Hilgard, ed., *Scholia in Dionysii Thracis artem grammaticam,* Grammatici graeci, I/3 (Leipzig: Teubner, 1901; reprint, Hildesheim: Olms, 1979), 128–50 (and corresponding prefatory material); Aristides Quintilianus appears on p. 136. See also Christian Hannick, "Antike Überlieferungen in der Neumeneinteilung der byzantinische Musiktraktate," *Jahrbuch der Oesterreichischen Byzantinistik* 26 (1977): 169–71.

[71] Mathiesen, *RISM BXI,* **215** and **273**; see also p. 432 *supra.*

[72] Ibid., **41, 63, 96, 101, 171, 193, 270, 279,** and **281.**

[73] Ibid., **109, 114, 183, 228–29,** and **282.**

The *De musica* of Aristides Quintilianus is neither a handbook (ἐγχειρίδιον) nor an introduction (εἰσαγωγή) on the technique or science of music. Rather, a wide range of materials—musical, philosophical, medical, grammatical, metrical, and literary—are woven together into an intricate and elaborately unified philosophical discourse in which music provides a paradigm for the order of the soul and the universe. The treatise reflects a highly systematic plan in its organization into three books, the first beginning with a proem and invocation and the third concluding with a peroration and valediction. Within this overall plan, the language is rigorous, systematic, and highly complex, enabling the author to develop implicit and explicit relationships among all the disparate types of material.

The design of the treatise is stated in the proem (1.1–3), written as if Aristides Quintilianus were addressing two friends, Florentius and Eusebius. Although the two do not reappear in the treatise, their presence at the beginning suggests that Aristides Quintilianus intended his work to be seen as a continuation of the tradition of the musico-philosophical dialogue. He may have had in mind as an immediate model the Plutarchean *De musica,* but in any case, he was certainly influenced by Plato's dialogues. The proem introduces various other arts and sciences, comparing them to music, which is presented as an art that transcends time and physical nature and offers a key to the order of the soul and the universe. Nor does Aristides Quintilianus neglect the practical reasons for studying music: it is both refreshing and beneficial. All these virtues notwithstanding, he believes music has fallen into disfavor and is no longer fully understood. He contends that no other treatise gives a full treatment of the art, by which he means a study in which the technical, ethical, and cosmological aspects of music are viewed as a grand paradigm leading to philosophy as the epistemological goal. In this way, Aristides Quintilianus suggests the design of the treatise: it will begin with a study of the technical details of music (Book I), proceed to consider the effect of music on character and its role in education (Book II), and conclude with an exegesis of number, the soul, and the order of the universe (Book III).

The proem concludes with an invocation to Apollo, who is associated with the neo-Platonic notions of unitary proportion (λόγος ἑνιαῖος) and pure form (εἶδος εὐαγές). By clearly establishing his design and philosophical base, Aristides Quintilianus follows the advice of Aristotle's *Rhetorica* (3.14) in providing the necessary focus for interpreting the content of the ensuing sections. In fact, the proem is recalled many times throughout the treatise, unifying the discourse and reminding the audience that the treatise is a continuously unfolding argument, not a simple compendium of unrelated materials.

Aristides Quintilianus quite naturally begins (section 4) by reviewing traditional definitions of music:

> Music is a science of melos and of those things contingent to melos. Some define it as follows: "the theoretical and practical art of perfect and instrumental melos"; and others thus: "an art of the seemly in sounds and motions."[74]

While none of these definitions exactly matches definitions found in earlier treatises, the first two suggest the Aristoxenian tradition, and the third, in its concern with seemliness, the ethical and educational tradition of Plato and Aristotle.[75] Dissatisfied with these definitions and subtly modifying the third, Aristides Quintilianus formulates his own new definition: "we define it more fully and in accordance with our thesis: 'knowledge of the seemly in bodies and motions,'"[76] by which he establishes his approach through neo-Platonist epistemology. Most of the terms employed in these definitions are explained in the balance of section 4 and will reappear over and over again in ever broadening contexts as the treatise unfolds. At least some of the explanations are familiar. In particular, the discussion of sound and types of motion recalls Aristoxenus's *De principiis*, sections II/A–B, II/P–Q, III–IV/A, and XI; Cleonides's *Harmonica introductio*, section II; Nicomachus's *Manuale harmonices*, chapters 2, 4, and 12; Gaudentius's *Harmonica introductio*, section 1; and Ptolemy's *Harmonica* 1.1. This will be Aristides Quintilianus's practice throughout Book I: he will make abundant use of earlier sources, but almost always without citing any authors.[77]

---

[74] Μουσική ἐστιν ἐπιστήμη μέλους καὶ τῶν περὶ μέλος συμβαινόντων. ὁρίζονται δ' αὐτὴν καὶ ὡδί· τέχνη θεωρητικὴ καὶ πρακτικὴ τελείου μέλους καὶ ὀργανικοῦ. ἄλλοι δὲ οὕτως· τέχνη πρέποντος ἐν φωναῖς καὶ κινήσεσιν (W.-I. 4.18–21). Mathiesen, *AQ on Music*, 74.

[75] The definitions are closely echoed by Bellermann's Anonymous 12 and 29–30 (Najock 76.1–3, 92.1–12) and Bacchius *Introductio artis musicae* 1. Cf. also Cleonides *Harmonica introductio* 1 (Jan 179.3–4).

[76] ἡμεῖς δὲ τελεώτερον ἀκολούθως τε τῇ προθέσει· γνῶσις τοῦ πρέποντος ἐν σώμασι καὶ κινήσεσιν (W.-I. 4.22–23, but without W.-I.'s emendations). Mathiesen, *AQ on Music*, 75.

With the definitions in hand, Aristides Quintilianus creates in section 5 his famous array of the various subclasses of music:

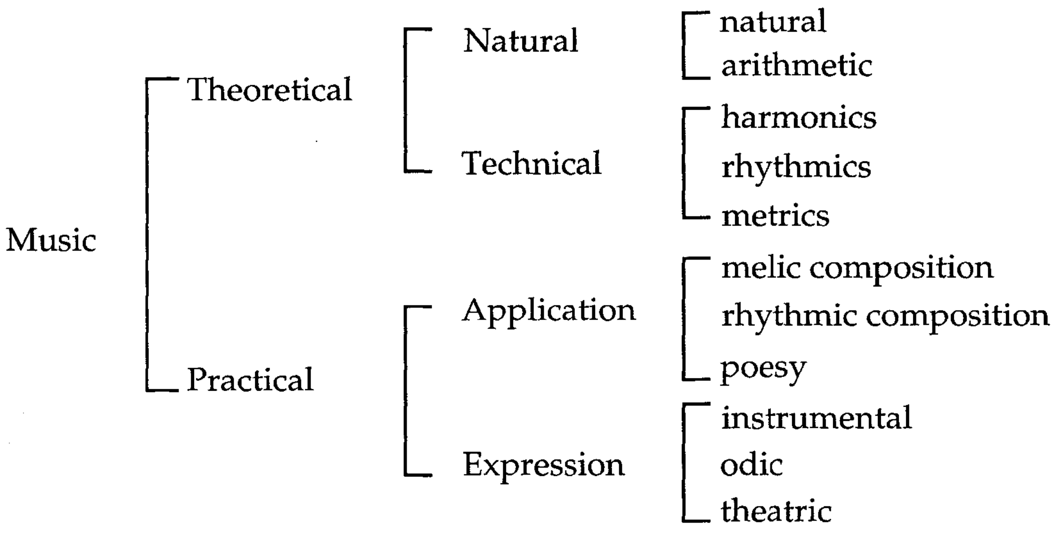


Figure 83.

Each of these subclasses will be explored and interrelated in an ever more complex fashion as the treatise progresses. For now, the final subclass, theatric expression, is defined as concerning the various bodily motions suited to pieces of music. This brings Aristides Quintilianus back to the subjects of motion (including ascent and descent) and the familiar definitions of pitch and a note. All this recalls not only Plato's *Theaetetus* (181c–d) and Aristotle's *Physica* 3.1 (201a10) but also the more specific technical definitions of Aristoxenus's *De principiis* and Cleonides's *Harmonica introductio*.[78] As might be expected, harmonics is the first of the subclasses to be discussed in any detail, and after outlining the seven traditional Aristoxenian categories (in the order notes, intervals, scales, genera, tonoi, modulations, and melic composition), Aristides Quintilianus attends to each of these in turn.

Aristides Quintilianus's treatment in sections 6–12 largely follows the Aristoxenian model, perhaps derived in part from the treatise of Cleonides, though many points differ in specifics. Like the earlier Aristoxenian treatises, Aristides Quintilianus observes that while the number of notes in nature might be infinite, there are really only twenty-eight functional notes, each of which he names, providing as well an explanation of the meaning of each of the note names and defining each as movable or immovable, as occupying a certain position within the pycnon or not, and as consonant, dissonant, or unison. He applies five further distinctions to notes: by pitch, by participation in one or more intervals, by participation in one or more scales, by position of the voice, and by ethos. The first three of these are self-explanatory, but Aristides Quintilianus promises that he will have more to say about position of the voice later in the treatise, adding that ethos may be affected by the types of notes in a piece of music. This will be a matter of considerable significance in Books II and III of the treatise. For now, he takes position of the voice to be more or less synonymous with tonos—as had Cleonides, who was probably simplifying Aristoxenus's more subtle conception.[79]

---

[77] Most of these parallel passages are identified and cited throughout Mathiesen, *AQ on Music*. There is little point in repeating all these citations here, and readers interested in particular parallel passages should refer to my earlier publication.

[78] See pp. 303–6 and 371–75 *supra*.

Aristides Quintilianus's discussion of intervals, scales, and genera (sections 7–9), while repeating familiar Aristoxenian doctrine,[80] in some cases also preserves important and subtle concepts largely forgotten by the later Aristoxenians, such as Aristoxenus's important concept of "synthesis," the coherent arrangement of musical intervals. In observing that no more than two tones, semitones, and dieses can be placed in sequence, Aristides Quintilianus echoes Aristoxenus's earlier dismissal of the Harmonicists' "close-packing" (καταπύκνωσις) of small intervals in their diagrams.[81] He does not specifically mention the Harmonicists, Pythagoreans, or Aristoxenians in this part of his treatise, but Aristides Quintilianus seems to be aware of the different camps as he defines his terms. First employing Aristoxenian terminology and a tone divided into twelve equal parts, he acknowledges the

---

[79] See also pp. 317–18 and 384–87 *supra;* and cf. Aristoxenus *De principiis,* sections III–VI; Cleonides *Harmonica introductio* 2, 4, and 12; Nicomachus *Manuale harmonices* 11–12; Gaudentius *Harmonica introductio* 2, 8, and 17; Bacchius *Introductio artis musicae* 20 and 43; and Bellermann's Anonymous 23, 33–44, and 63–64 (Najock 82.5–8; 94.4–100.8; 112.5–114.3).

[80] Especially as articulated by Cleonides; see pp. 375–84 *supra.*

[81] See pp. 302, 309–10, 314–15, 327, and 330–32 *supra.*

Pythagorean objection as he explains the meaning of the term semitone:

> and the half of the tone—or what is loosely about equal to a tone, for they do not say that the tone is cut into equal parts as if this can truly be done equally—was called the semitone.[82]

But when he adds to these definitions a diagram (figure 84) purporting to set out the "harmonia of the ancients" (ἡ παρὰ τοῖς ἀρχαίοις ἁρμονία), with the first octave comprised of twenty-four dieses and the second of semitones, he does not seem to recognize it as just the sort of diagram Aristoxenus might have deplored for its close-packing.

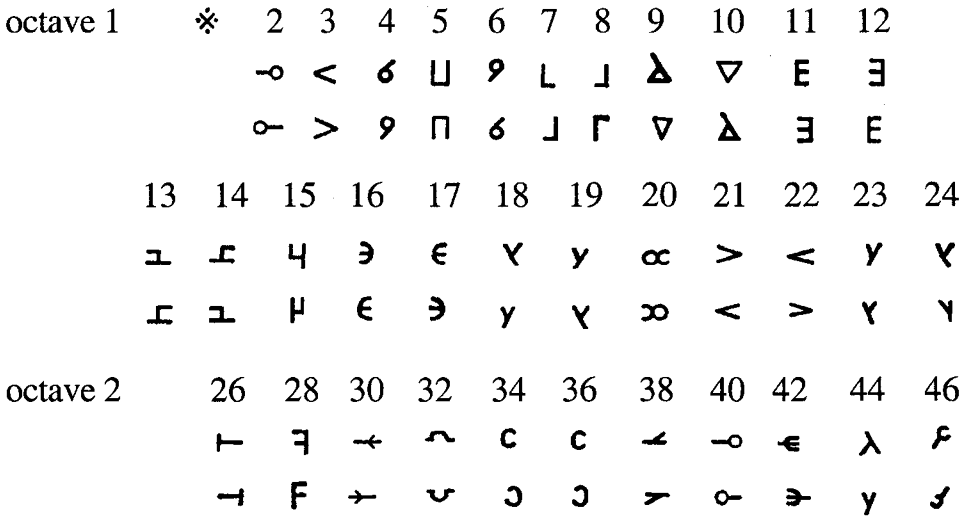


Figure 84.

The diagram itself is frequently garbled in the manuscripts, but a good portion of it can be restored with relative certainty.[83]

---

[82] ἡμιτόνιον δὲ ἤτοι τὸ ἥμισυ τοῦ τόνου ἢ τὸ ἁπλῶς τόνῳ παραπλήσιον· οὐ γάρ φασιν εἰς ἴσα τέμνεσθαι τοῦτον, ὥσπερ ἴσως καὶ τἀληθὲς ἔχει (W.-I. 12.9–11). On Aristides Quintilianus's discussion of intervals, cf. Aristoxenus *De principiis*, sections II/K, IX, XIII; Aristoxenus *Elementa harmonica I*, section III and *Elementa harmonica II*, section I; Cleonides *Harmonica introductio* 5; Nicomachus *Manuale harmonices* 12; Gaudentius *Harmonica introductio* 3; and Bellermann's Anonymous 58 (Najock 108.1–5).

[83] The Arabic numerals in figure 84 are of course merely transcriptions of the original Greek numerals. See F. L. Perne, "Recherches sur la musique antique," *Revue musicale* 3 (1828): 433–41 and 481–91; 4 (1829): 25–34 and 219–28; J. F. Bellermann, *Die Tonleitern und Musiknoten der Griechen* (Berlin: Förstner, 1847; reprint, Wiesbaden: Sändig, 1969), 61–65; Henri Potiron, "Les notations d'Aristide Quintilien et les harmonies dites Platoniciennes," *Revue de musicologie* 47

The similarity of so many of the signs in this diagram to those in the tables of Alypius makes it reasonable to assume these are pitch notes, and if pairs were provided for notes 15 and 20, a sufficient number of symbols would be present in octave 1 (rows 1 and 3 or rows 2 and 4) to notate twenty-four dieses, with note 2 as the initial pitch. In fact, this initial shape does bear some resemblance to the lowest note in the tables of Alypius, the proslambanomenos of the Hypodorian tonos: ⌓. Moreover, in his later discussion of notation in section 11, Aristides Quintilianus refers to the symbol ※ as preceding the first pitch of the Hypodorian; it is therefore possible that this symbol belongs in row 1 with the pitch notes, marking the beginning of the series. In octave 2 (rows 5 and 6), a final symbol (48) would be necessary to fill out the pattern.

With a few exceptions, the notation is based on pairs of symbols, rotated around some axis and further reflected between the upper and lower rows, a pattern of rotation also appearing in the instrumental notation in the tables of Alypius, with their parallel vocal and instrumental notations.[84] Here, however, the purpose of the parallel rows is not immediately apparent; the even (or odd) rows may represent simply a process of dittography, an alternative pattern of rotation, or perhaps even a set of options to indicate whether the line is moving upwards or downwards.[85] Aristides Quintilianus provides no further explanation of this diagram, and a fully convincing interpretation of it remains elusive. In sections 9 and 11, where other notational diagrams appear, he employs the conventional vocal and instrumental notation of the tables of Alypius.

Unlike Cleonides and Gaudentius, Aristides Quintilianus does not include the octave compounds in his description of scales, nor does he provide a separate discussion of the various species of fourth and fifth, although he is clearly aware of this material (he states: "There is also a difference among the scales according to

---

(1961): 159–76; R. P. Winnington-Ingram, "The First Notational Diagram of Aristides Quintilianus," *Philologus* 117 (1973): 243–49; Jacques Chailley, "La notation archaïque grecque d'après Aristide Quintilien," *Revue des études grecques* 86 (1973): 17–34; and Martin L. West, "Analecta musica," *Zeitschrift für Papyrologie und Epigraphik* 92 (1992): 42–46.

[84] See pp. 598–605 *infra*.

[85] It is also possible that the diagram is a late invention in which the patterns are followed for their own sake rather than for any actual musical meaning.

species"[86]). He follows Aristoxenus (but not Cleonides or Gaudentius) in recognizing that scales may be "common" as well as "conjunct" or "disjunct," and he recalls the ancient terms for the fourth, fifth, and octave (syllaba, dioxeian, and harmonia) as a way of introducing his list of the traditional seven octave species together with their ethnic names. It is noteworthy that these terms appear in Nicomachus's *Manuale harmonices* (in the famous passage attributed to Philolaus) and Porphyrius's commentary to Ptolemy's *Harmonica* (in passages attributed to Thrasyllus and Aelian) but not in any of the Aristoxenian treatises.[87]

In describing the genera, Aristides Quintilianus expands the twelve-part division of the Aristoxenian tone, which he had used in his consideration of intervals, to a twenty-four-part division, no doubt to avoid such fractions as are encountered in Cleonides's description of the shades.[88] Otherwise, the descriptions are identical. But Aristides Quintilianus also includes a few brief statements about possible melodic progressions for the genera, including sequence (ἀγωγή) and succession (πλοκή)—terms that return, together with repetition (πεττεία), in the section (12) devoted to melic composition. Cleonides includes all these terms as well as a fourth term, prolongation (τονή), in his section (XI) on melic composition, and it is not clear why Aristides Quintilianus would have anticipated the terms at this point in his treatise.

Aristides Quintilianus concludes his consideration of the genera with his well-known description of the "divisions, which the exceedingly ancient peoples used for their harmoniai"[89] (figure 85). Although not genera in the abstract, these scales do represent noteworthy gapped sequences and most probably enharmonic genera. All of them fall within the Hypolydian tonos and are notated in common Alypian notation. The disjunctive nature of the scales supports the descriptions of early scales offered in the

---

[86] ἔστι δὲ αὐτῶν καὶ ἡ κατ' εἶδος διαφορά (W.-I. 14.12–13).

[87] Cf. Aristoxenus *De principiis,* sections II/G and X; *Elementa harmonica I,* sections I/B/6 and V; and *Elementa harmonica II,* section I; Cleonides *Harmonica introductio* 8; Nicomachus *Manuale harmonices* 12; Gaudentius *Harmonica introductio* 4, 6–7, 9, and 19; and Bellermann's Anonymous 51 and 62 (Najock 104.5–7; 110.7–112.4). On Philolaus, see pp. 401–2 *supra.*

[88] See pp. 313 and 377 *supra.*

[89] διαιρέσεις, αἷς καὶ οἱ πάνυ παλαιότατοι πρὸς τὰς ἁρμονίας κέχρηνται (W.-I. 18.5–6).

Plutarchean *De musica* (1134f–1135b, 1137b–e, and 1141b–c) and Aristoxenus's *De principiis* (section X), where gapped scales are specifically mentioned. The scales have also attracted attention because both the Dorian and the Phrygian contain all the pitch notes found in the *Orestes* fragment of the third century B.C.E.[90]

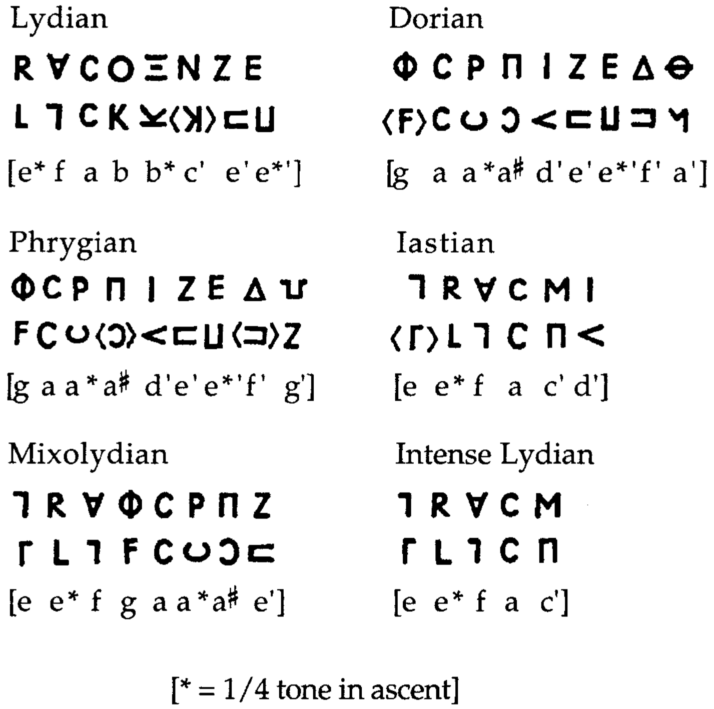

Lydian
[e* f a b b* c' e' e*']
Dorian
[g a a* a♯ d' e' e*' f' a']
Phrygian
[g a a* a♯ d' e' e*' f' g']
Iastian
[e e* f a c' d']
Mixolydian
[e e* f g a a* a♯ e']
Intense Lydian
[e e* f a c']
[* = 1/4 tone in ascent]

Figure 85.

It is impossible, of course, to know Aristides Quintilianus's source for these scales. Just prior to presenting the scales, he recalls Plato's characterizations of the Mixolydian and Intense Lydian as threnodic and the Iastian and Lydian as convivial and indulgent. From this, Plato concludes, as Aristides Quintilianus quotes him: "it seems that you have the Dorian and Phrygian left over."[91] The scales may indeed be early or they may have been derived from a commentary on Plato's *Respublica*.[92] Whether or not the scales are truly early, the presence of notational diagrams in both sections 7 and 9 provides a further example of the importance of musical notation to the later theorists.

---

[90] See pp. 116–20 *supra.*

[91] κινδυνεύει σοι δωριστὶ λελεῖφθαι καὶ φρυγιστί (W.-I. 19.6–7). Cf. Plato *Respublica* 3.10 (399a). After this statement, Socrates does indeed allow that these two harmoniai should be permitted in the ideal state.

[92] Aristides Quintilianus does not say these are the scales of Plato's *Respublica,* although they are often described as such in the scholarly literature. After outlining the constitution of each scale, he simply states that "Plato in the *Respublica* surely calls these to mind when he says that both the Mixolydian and

In his treatment of tonoi and modulation (sections 10–11), Aristides Quintilianus quickly passes over alternative definitions of the term "tonos" (such as "note," "pitch," or "interval," all of which are provided by Cleonides) in order to concentrate on its meaning as a "scalar mode" (τρόπος συστηματικός). Cleonides had attributed thirteen tonoi, or "positions of the voice," to Aristoxenus, and Aristides Quintilianus repeats this attribution, adding however that "younger theorists" (οἱ νεώτεροι) have expanded this group to fifteen, "so that each tonos might have a low, medial, and high pitch."[93] The proslambanomenoi of the fifteen tonoi

---

intense Lydian are threnodic, while the Iastian and the Lydian are convivial and exceedingly indulgent" (τούτων δὴ καὶ ὁ θεῖος Πλάτων ἐν τῇ Πολιτείᾳ μνημονεύει λέγων θρηνώδεις μὲν εἶναι τήν τε μιξολυδιστὶ καὶ τὴν συντονολυδιστί, συμποτικὰς δὲ καὶ λίαν ἀνειμένας τήν τε ἰαστὶ καὶ λυδιστί [W.-I. 19.2–5]). In his *Music and Musicians in Ancient Greece* (p. 154, n. 9), Warren Anderson accuses me of mistranslating this passage and misunderstanding Aristides Quintilianus's emphasis. But in fact I do note the emphasis in my translation ("surely calls these to mind"), which preserves as well the sense of all words based on the root μνημ-, i.e., memory, remembrance, recollection, and so on. Anderson wishes to believe that these **are** the scales Plato knew and envisioned in this passage of the *Respublica* ("... Aristides' extremely explicit declaration—recently misinterpreted—that they are the modes Plato had in mind when he gave directions concerning which ones should or should not be countenanced for the music of his ideal city-state."). When he says that Aristides Quintilianus "could hardly have phrased his statements more emphatically ... or more plainly," I agree: saying that Plato called these to mind is hardly synonymous with a declaration of fact or identity, and had Aristides Quintilianus wished to do so, he could have written that the modes just described **are** the modes Plato knew and envisioned in the *Respublica*. I believe Aristides Quintilianus, like any good musicologist, was aware that he could not know the specific scales in use seven centuries or more before his own time—and certainly not in a specific author's conception—and thus chose to say exactly what he did say: these are scales of "exceedingly ancient" people, and "Plato in the *Respublica* surely calls these to mind." As I stated in my commentary (p. 20; also criticized by Anderson), "With this, he [Aristides Quintilianus] does not in any sense state that the exceedingly ancient peoples are to be thought contemporary with Plato or that Plato claims these particular note patterns as his own." Thus, I stand by my assertion that it is not apt to describe these as the scales of Plato's *Respublica*.

[93] ὅπως γ' ἂν ἕκαστος βαρύτητά τε ἔχοι καὶ μεσότητα καὶ ὀξύτητα (W.-I. 21.3–4). In fact, just such a set of fifteen tonoi is preserved in the tables of Alypius. See p. 599 *infra*.

span an octave and a tone and would be arrayed (given the conventional pitching) as in figure 86:

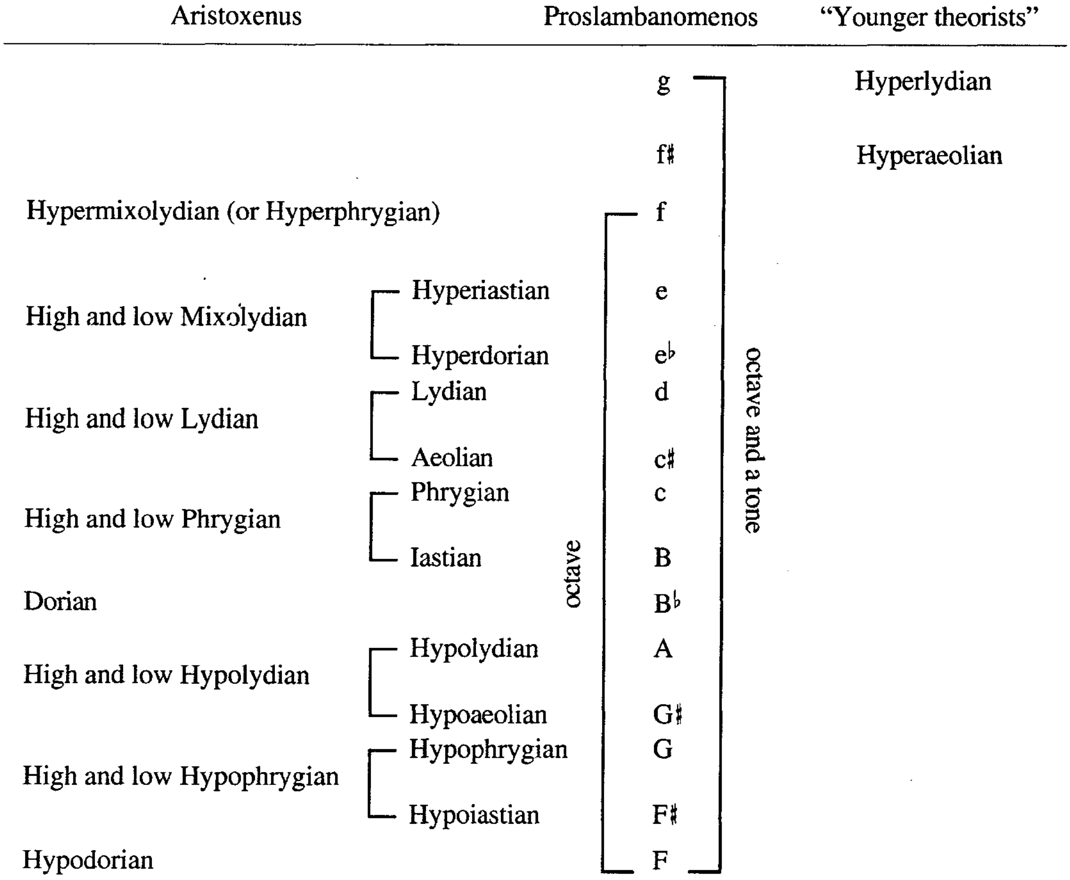

Aristoxenus
Proslambanomenos
"Younger theorists"
g
Hyperlydian
f♯
Hyperaeolian
Hypermixolydian (or Hyperphrygian)
f
Hyperiastian
High and low Mixolydian
e
Hyperdorian
e♭
Lydian
d
High and low Lydian
Aeolian
c♯
Phrygian
c
High and low Phrygian
Iastian
B
Dorian
B♭
Hypolydian
A
High and low Hypolydian
Hypoaeolian
G♯
Hypophrygian
G
High and low Hypophrygian
Hypoiastian
F♯
Hypodorian
F
octave
octave and a tone

Figure 86.[94]

Although there are now fifteen tonoi, Aristides Quintilianus adds that tonoi other than the Dorian, Phrygian, and Lydian were primarily used in instrumental compositions. He follows the earlier Aristoxenians in observing that while modulations among the tonoi were always possible and could involve shifts of as little as a semitone, modulations involving shifts of a consonant interval (for example, from the Dorian to the Hyperdorian tonos or from the Phrygian to the Hypophrygian tonos) were more graceful.[95] In order to demonstrate the commonalities among the tonoi, which provide a basis for determining points at which modulations might be made, Aristides Quintilianus employs Alypian notation to provide three diagrams: one arraying the symbols by semitone; another displaying them by tone; and finally "a diagram of the modes akin to a wing" (πτέρυγι δὲ τὸ διάγραμμα τῶν τρόπον γίνεται παραπλήσιον), which illustrates the various relationships among the tonoi. This final diagram is not preserved in the manuscript tradition, but it can be reliably restored (figure 87).[96] Aristides Quintilianus provides no explanation of the symbols; he seems to assume that his readers will understand their meaning, even though he states that in order to conceal musical esoterica, his diagrams will use letters "instead of the letters in use."[97] Inasmuch as the symbols in these three diagrams are recognizable as those preserved in the treatises of Gaudentius and Alypius, it would seem that Aristides Quintilianus knew of other notational systems in current use (perhaps including the notation exhibited in figure 84) and that Alypian notation may have been primarily used to record compositions in literary works or for archival purposes rather than to provide notation actually used in performance.

---

[94] See pp. 385–86 (and n. 55) *supra.*

[95] See pp. 387–88 *supra.*

In any event, for each tonos, the diagram of the modes provides the symbols for all the notes from proslambanomenos through mese, including the symbols for both the chromatic (or enharmonic) and diatonic lichanos. It clearly illustrates that modulations between tonoi separated by only a semitone, tone, or ditone have relatively few commonalities, while modulations separated by one of the consonant intervals tend to function as extensions of the tonos to a lower or higher level. Aristides Quintilianus does not provide any elaboration, but it is readily apparent that modulations are effected by the same symbols representing different functional notes, just as Cleonides had observed in his discussion of scales.[98]

---

[96] See Mathiesen, *AQ on Music*, 21–24 and 90–91 (from which the figure is taken, but with a few minor corrections); and Rudolf Schäfke, ed., *Des Aristeides Quintilianus Harmonik* (Tutzing: Hans Schneider, 1976), 10–11 and 30.

[97] καὶ ὅπως τὰ κατὰ μουσικὴν ἀπόρρητα συγκρύπτωμεν εὐκόλως, ἀντὶ τῶν ἐν χρήσει γραμμάτων ⟨τὰ⟩ κατὰ τὴν τονικὴν ἔκθεσιν ὑπογεγραμμένα κατατάττοντες (W.-I. 23.22–25).

[98] See pp. 383–84 *supra*. In figure 87, the conventional pitch indicated for columns 5, 8, 11, 14, 17, 21, 24, 27, 30, 33, 36, and 39 in the Dorian, Phrygian, and Lydian tonoi (and their Hypo- and Hyper- forms) must be read a half-step higher when the symbol represents the chromatic (or enharmonic) lichanos. Because Alypian symbols may represent various functions of notes, they cannot always be assigned a fixed pitch.

DIAGRAM OF MODES

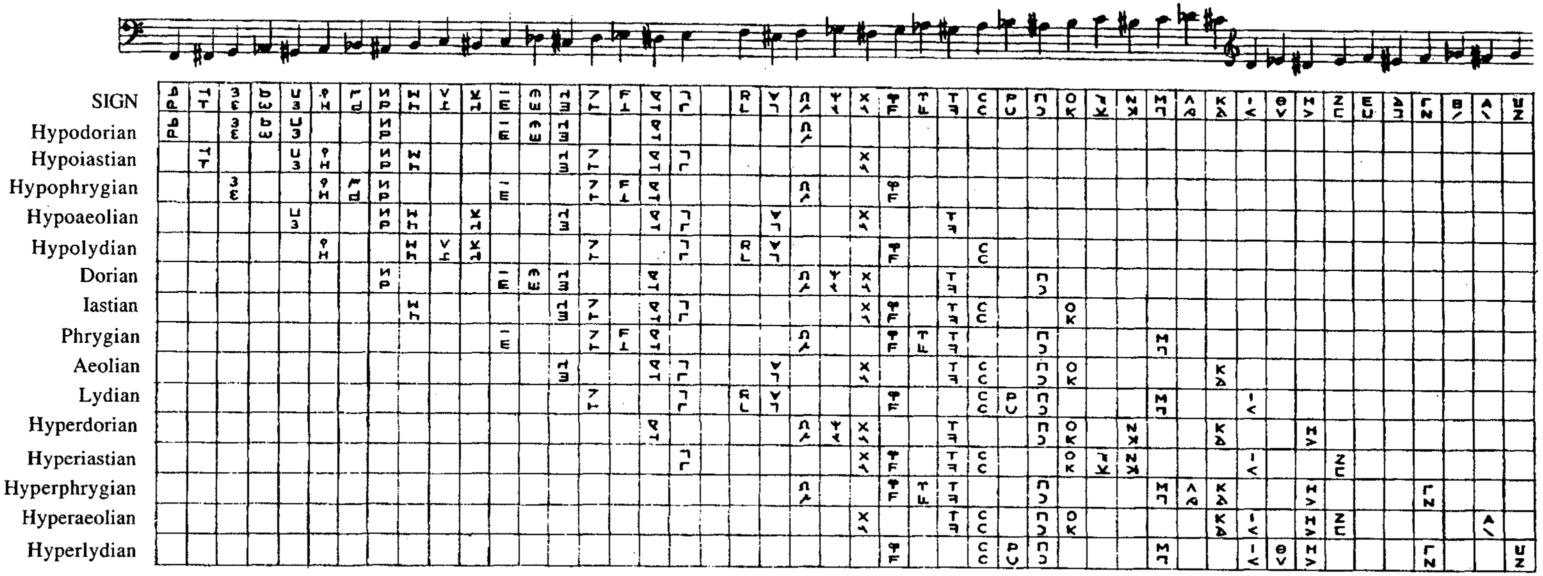

SIGN
Hypodorian
Hypoiastian
Hypophrygian
Hypoaeolian
Hypolydian
Dorian
Iastian
Phrygian
Aeolian
Lydian
Hyperdorian
Hyperiastian
Hyperphrygian
Hyperaeolian
Hyperlydian

Figure 87.

At the very end of section 11, almost as if it were an afterthought, Aristides Quintilianus mentions three special terms used to describe unusual intervallic patterns: eklusis, a descent of three incomposite dieses; spondeiasmos, an ascent of three incomposite dieses; and ekbole, an ascent of five dieses. These terms also appear in the Plutarchean *De musica,* although without specific definition, but it is more likely that Aristides Quintilianus derived his material from the Aristoxenian tradition.[99]

The first of the three parts of Book I concludes with a discussion of melic composition, which once again exhibits significant parallels with the treatise of Cleonides. For Aristides Quintilianus, melic composition is a matter of creating a complex of such technical elements as genus, tonos, and scale that will best serve the overall type and character of the composition in order to create an ethos (ἦθος) most suitable for paideia. He identifies choice (λῆψις), mixing (μίξις), and usage (χρῆσις) as the three basic parts of this process. Choice pertains to the selection the proper scale and position of the voice; this is followed by mixing the notes, positions of the voice, genera, and scales, within which three types of musical gestures—usage—are possible: sequence (ἀγωγή), succession (πλοκή), and repetition (πεττεία).[100] Three forms of sequence are employed: straight (εὐθεῖα), in which the melody ascends by consecutive notes; returning (ἀνακάμπτουσα), in which the melody moves oppositely; and revolving (περιφερής), particularly used for modulation, in which the melody shifts between conjunct and disjunct tetrachords while moving up and down. Succession describes a pattern in which the notes outline a series of parallel intervals moving up or down (e.g., c–e–d–f–e–g–f–a or c–f–d–g–e–a or other comparable patterns), and repetition is a matter of knowing which notes should be used (and how often) and which not.[101]

Aristides Quintilianus remarks that the particular notes used will indicate the ethos of the composition, and in Books II and III, he will develop this point in a series of elaborate descriptions of the masculine and feminine characteristics of notes (and other musical elements) and the ways in which the notes convey cosmic harmony through a process of emanation and mimesis. But at this point, he largely follows Cleonides in identifying three types of ethos: diastaltic (διασταλτικόν), or elevating; systaltic (συσταλτικόν), or depressing; and medial (μέσον), or soothing, which evoked quietude.[102] Three "modes" of melic composition in accord with major musico-poetic types—dithyrambic, nomic, and tragic—are also identified and related to ethos, but as the first part of Book I closes, the reader can hardly anticipate the conclusion to which all this is leading.

---

[99] See pp. 357–60 *supra.*

[100] Cleonides adds a fourth, prolongation (τονή). See p. 389 *supra.*

[101] Examples of sequence and succession appear in the famous Epitaph of Seikilos: the first half of line 2 exhibits sequence and lines 3–4 exhibit succession. See p. 149 *supra.* Additional melodic figures are described in Bellermann's Anonymous, but these doubtless pertain more to Byzantine than to ancient Greek music.

The second part of Book I (sections 13–19) deals with rhythmic theory, and it quickly becomes clear that Aristides Quintilianus will adhere to the order of divisions and classes delineated in section 5. There, the technical class of the theoretical division encompasses the subjects of harmonics, rhythmics, and metrics, complemented by the application class of the practical division, comprised of melic composition, rhythmic composition, and poesy. Harmonics and melic composition were treated in the first part of Book I, rhythmics and rhythmic composition will occupy the second, and a consideration of metrics and poesy will conclude Book I. The remaining classes, the natural (from the theoretical division) and expression (from the practical division) will be covered in Books II and III.

Much of the material on rhythmics is once again drawn from Aristoxenus,[103] but parallels with Hephaestion's *Encheiridion* and Dionysius of Halicarnassus's *De compositione verborum* may also be detected.[104] Aristides Quintilianus's rhythmic theory follows the same design as that of the preceding part, employing many of the same stylistic patterns. First, some preliminary definitions are offered (section 13), recalling the definitions of sections 4 and 5. According to Aristides Quintilianus, the term "rhythm" may be used in three ways:

---

[102] Cleonides calls the medial "hesychastic" (ἡσυχαστικόν). See pp. 388–89 *supra.*

[103] See pp. 334–44 *supra.*

[104] See chapter 2, nn. 42–43 *supra.*

> it is used for motionless bodies (as we speak of a eurhythmic statue), for all things that move (for so we say that someone walks eurhythmically), and in a particular sense for sound ....[105]

In this last sense, rhythm is a "scale of chronoi" (σύστημα ἐκ χρόνων), following some order, articulated by "arsis" and "thesis,"[106] and perceived both visually and aurally. Rhythm in music pertains to the melody, the text, and bodily movement, but it can also exist apart from melos in dance and in poetry. Rhythm has a direct relationship to the power of a melody: if there is too little variety, the melody will be inexpressive. In section 19, Aristides Quintilianus accordingly adds that rhythm molds and moves melos, seeing it as a masculine, active force operating on the feminine, passive character of melos.

Section 14 begins with a consideration of the first of the five parts of rhythmics: the "protos chronos" (πρῶτος χρόνος), the smallest unit of rhythm and equivalent to a short syllable, parallel to notes and intervals (discussed in sections 6 and 7), the basic units of harmonics; then, Aristides Quintilianus proceeds to take up the seven different types of rhythmic feet, parallel to the seven differences of scales (section 8), as well as the three rhythmic genera—equal, sesquialteran, and duple—, like the three melodic genera considered in section 9. All of this follows Aristoxenus quite closely, although in some places Aristides Quintilianus adds supplemental detail.[107]

Sections 15–17 provide a summary of the generic types of rhythmic feet: the dactylic (with arsis and thesis in equal ratio), the iambic (in duple ratio), and the paeonic (in sesquialteran ratio); and possible combinations producing more elaborate and varied rhythms. Each type is illustrated with detailed descriptions of composite and incomposite rhythmic patterns, useful in defining the groupings of long and short syllables that appear in verse.[108]

Some rhythmic theorists apparently conceived rhythm in terms of numbers of chronoi, divided on the basis of mere numerical ratios into rhythmic feet, apart from any consideration of their function within a meter. Without naming them, Aristides Quintilianus refutes their approach in section 18 in an argument reminiscent of Aristoxenus's refutations of the Harmonicists—although nothing like this survives in his *Elementa rhythmica.* The process described by Aristides Quintilianus in fact suggests some characteristics of later medieval rhythmic theory,[109] but apart from this passage, there is no evidence for such a numerically based rhythmic theory in antiquity.

---

[105] λέγεται γὰρ ἐπί τε τῶν ἀκινήτων σωμάτων (ὥς φαμεν εὔρυθμον ἀνδριάντα) κἀπὶ πάντων τῶν κινουμένων (οὕτως γάρ φαμεν εὐρύθμως τινὰ βαδίζειν) καὶ ἰδίως ἐπὶ φωνῆς (W.-I. 31.3–6).

[106] See p. 339 *supra.*

[107] See pp. 340–43 *supra* for a discussion of the types of rhythmic feet and genera, including passages from this section of Aristides Quintilianus's treatise.

[108] See Mathiesen, *AQ on Music,* 97–100.

Tempo (ἀγωγή), rhythmic modulation (μεταβολὴ ῥυθμική), and rhythmic composition (ῥυθμοποιΐα) are treated in section 19, the last two of which parallel the respective sections (11 and 12) in the first part of Book I. Aristides Quintilianus specifies twelve types of rhythmic modulation and observes that rhythmic composition—like melic composition—involves choice, mixing, and usage, and three types of ethos, although in this instance he replaces "medial" with "hesychastic."[110] By noting the "best rhythmic composition is that productive of virtue; the worst, that of evil,"[111] he anticipates the ethical considerations in Book II (especially section 15) of his treatise.

The final part of Book I, on metrics, varies somewhat in design from the pattern of the first two parts. Section 20 treats phonic elements, similar to what are now called phonemes, as equivalent to notes (section 6). In fact, φθόγγος, note, also means "sound," and the two definitions are parallel: "A note is the smallest part of musical sound" and "An element is the smallest part of articulate sound."[112] Each of the types is defined; from these, syllables (section 21) are composed, parallel to the intervals of harmonics (section 7). Scales of syllables form metric feet (section 22, parallel to section 8), each of which is discussed in sections 23–28[113] (roughly parallel to sections 9 and 10 on the genera and tonoi).

---

[109] See John Stevens, *Words and Music in the Middle Ages: Song, Narrative, Dance and Drama, 1050–1350*, Cambridge Studies in Music (Cambridge: Cambridge University Press, 1986), chap. 12.

[110] See n. 102 *supra.*

[111] ἀρίστη δὲ ῥυθμοποιία ⟨ἡ τῆς⟩ ἀρετῆς ἀποτελεστική, κακίστη δὲ ἡ τῆς κακίας (W.-I. 40.17–18).

[112] Φθόγγος μὲν οὖν ἐστι φωνῆς ἐμμελοῦς μέρος ἐλάχιστον (W.-I. 7.15–16) and Στοιχεῖον μὲν οὖν ἐστι φωνῆς ἐνάρθρου μέρος ἐλάχιστον (W.-I. 41.3–4).

[113] See Mathiesen, *AQ on Music*, 107–13.

The final section (29), like those of the prior parts of Book I, defines "the object of the science of metric" (ὁ σκοπὸς τῆς μετρικῆς) as poetry, the final subclass of the application class of the practical division of music. Aristides Quintilianus does not actually say much about this subject, beyond observing various structural possibilities: poems might be written in single meters or might make use of several different meters; some have stropic correspondence while others do not; some antistrophes follow the order of meters in the strophe while others reverse the order; and so on. Most of this echoes descriptions in Hephaestion's *Encheiridion*.

Aristides Quintilianus's sections on rhythm and meter certainly provide the most extensive and detailed treatments of the subject in the corpus of ancient Greek music theory, and they are among the most important early sources for the study of these fields, even apart from music.[114] In his vocabulary and development of definitions, Aristides Quintilianus carefully conjoins harmonics, rhythmics, and metrics, emphasizing the inextricable relationship among the fields. This alone should mark his treatise for special distinction, but in the subsequent books, he will extend his consideration far beyond these technical classes to explore much larger relationships explaining the ethical and educational power of music.

The treatise's second book concentrates on an examination of the role of music in education. Here, Aristides Quintilianus applies the elements of harmonics, rhythmics, and metrics to the larger consideration of ethics and, in so doing, pursues the outline of the proem: "To me, there is especially apparent a specific good in the art, for its [music's] utility is considered not like the rest of the subjects that respect one matter or a small interval of time, but every age and the whole of life, every action should at last be set in order by music alone."[115] Later in the proem, he had observed that music is suitable for children "because of the good things deriving from melody and for those advancing in age because it transmits the beauties of measured diction and, simply, of discourse as a whole,"[116] while for those who have reached maturity, music is valuable in its ability to explain the nature of numbers, to reveal the harmonia[117] present through number in all bodies, and ultimately to reveal the ratios of the soul and the universe. The educational role of music is therefore not limited to childhood but functions throughout life.

---

[114] The value of early rhythmic and metric theory within the field of modern metrics is a highly controversial matter. I discuss some of the issues in "Rhythm and Meter" (see chapter 2, n. 43 *supra*).

[115] ἐμοὶ δὲ μάλιστα κἀκεῖνο τῆς τέχνης ἴδιον ἀγαθὸν συνορᾶται· οὐ γὰρ ὥσπερ αἱ λοιπαὶ περὶ μίαν ὕλην πραγμάτων ἢ περὶ χρόνου διάστημα μικρὸν χρησιμεύουσα θεωρεῖται, ἀλλὰ πᾶσα μὲν ἡλικία καὶ σύμπας βίος, ἅπασα δὲ πρᾶξις μουσικῇ μόνῃ τελέως ἂν κατακοσμηθείη (W.-I. 1.14–19).

These notions are echoed at the beginning of Book II in the form of five questions: (1) can music teach? (2) can it do so usefully? (3) can it teach all men? (4) can only a single type of melic composition teach? and (5) might there be some benefit to the types of music rejected as useless for education? The answers are deferred until an explication of the soul is completed (sections 2–3) because "just as it is not possible to discern each of the other arts until we understand on what it bases its effort, so also we are not able to learn paideia in music unless we have first discerned the soul upon which it bestows every care."[118]

The treatment of the soul, as well as the discussion of the five questions and additional material appearing in Book II, is developed by Aristides Quintilianus from a variety of sources, the identity of which has been the subject of some debate.[119] Whatever the actual sources for Aristides Quintilianus's treatment, the concepts are all characteristic of the neo-Platonic school (especially the writings of Plotinus and Porphyrius, but also perhaps Iamblichus) and reflect material derived from (or drawn directly from) the known works of Aristotle, Theophrastus, Heracleitus, Galen, Plutarch, Dionysius of Halicarnassus, Cicero, and especially Plato.

---

[116] τοῖς ἐκ μελῳδίας ἀγαθοῖς καὶ προβαίνουσι τά τε τῆς ἐμμέτρου λέξεως καὶ ἁπλῶς λόγου σύμπαντος παραδιδοῦσα κάλλη (W.-I. 2.9–11).

[117] While "harmonia" may have a limited technical meaning in most of the other treatises, synonymous (more or less) with tonos, Aristides Quintilianus is very much aware of its larger philosophical meaning. For a consideration of this important term, see Thomas J. Mathiesen, "Problems of Terminology in Ancient Greek Theory: 'APMONIA," in *Festival Essays for Pauline Alderman*, ed. Burton Karson (Provo, Utah: Brigham Young University Press, 1976), 3–17; and P. Bonaventura Meyer, *'APMONIA. Bedeutungsgeschichte des Wortes von Homer bis Aristoteles* (Zürich: Gebrüder Leemann, 1932).

[118] ὥσπερ γὰρ οὐδὲ τῶν ἄλλων τεχνῶν ἑκάστην οἷόν τε διαγνῶναι, πρὶν ἐφ' ᾧ τὴν σπουδὴν τίθεται κατανοήσαιμεν, οὕτως οὐδὲ τὴν κατὰ μουσικὴν παιδείαν δυνατὸν μαθεῖν μὴ πρότερον ψυχῆς ἡμῖν, ἧς πᾶσαν ποιεῖται τὴν ἐπιμέλειαν, διεγνωσμένης (W.-I. 53.9–13).

[119] The debate centers on the degree to which Book II represents a source for the theories of Damon of Athens and perhaps even preserves actual Damonian fragments. The principal proponents of Book II as a source for Damonian theories are Hermann Deiters, *De Aristidis Quintiliani doctrinae harmonicae fontibus*, Programm Düren (Bonn, 1870); and Hermann Koller, *Die Mimesis in der Antike* (Bern: Francke, 1954). Rudolf Schäfke, trans., *Aristeides Quintilianus von der Musik* (Berlin: M. Hesse, 1937), 104–41, supports the premise, but with caution.

Book II is separated into three main parts: sections 1–6 comprise the first part, sections 7–16, the second; and sections 17–19, the third. The first part begins with the opening questions and the explication of the soul, proceeds to a preliminary answer to question 3 (and implicitly, therefore, also to questions 1 and 2), then offers a survey of "the ancients'" views of the impact of music on character and the reasons for its force, followed by a demonstration of the validity of the ancient notions, which is based on a description of the Roman use of music (drawn from Cicero's writings) and a description of civic and ethnic characters. The part concludes with a summation—of considerable rhetorical beauty—on the ethical force and value of music.

The concepts presented in this part (with the exception, of course, of the segment on Cicero and Rome) are closely related to at least four works of Plato: *Phaedrus, Timaeus, Respublica,* and *Leges*.[120] A considerable number of precise parallels could be drawn, but a few may suffice here as examples of Aristides Quintilianus's use of this material. In section 2, Aristides Quintilianus notes that the soul cannot be present on earth unless it is contained by a body, which descends to its proper depth, a close parallel of *Phaedrus* 246–248.[121] He observes that the one who manages the universe contrives that the soul be the satrap of bodies; likewise, *Timaeus* 34c notes that the soul is to be the ruler of the body and the body, the ruled. The notions of (1) the Ideas, "the beautiful things from that place" (τὰ ἐκεῖθεν καλά), and the "fore-

---

Refutation of the Damonian connection is provided by Gerald F. Else, "'Imitation' in the Fifth Century," *Classical Philology* 53 (1958): 73–90; and Carnes Lord, "On Damon and Music Education," *Hermes* 106 (1978): 32–43. See also François Lasserre, "La postérité de l'éthique damonienne," in *Plutarque, De la musique* (Olten and Lausanne: URS Graf-Verlag, 1954), 80–87; Warren D. Anderson, *Ethos and Education in Greek Music* (Cambridge: Harvard University Press, 1966), 74–81; and Zanoncelli, "Filosofia musicale," 77–81 (n.b. n. 116).

[120] Most of these concepts also appear in Plotinus's *Enneades,* as well as in the work of Aristotle.

[121] Cf. Plotinus *Enneades* IV.8.[6].

knowledge of sensible objects" (ἡ τῶν δεῦρο πρόνοια);[122] (2) the two parts of the soul, rational and irrational; and (3) forgetfulness are all found in *Phaedrus* 245–248, 253e and *Timaeus* 41e–42d. The twofold distinction of the irrational part of the soul, that is, the epithymetic (ἐπιθυμητικόν) and thymic (θυμικόν) parts, appears in Aristotle's *Ethica Nicomachea* 1.13, and a general treatment of the soul similar to Aristides Quintilianus's as it will develop throughout Books II and III is preserved in Plato's *Respublica* 4.15 (440b–441c).[123]

Sections 3 and 4 appear to be based on the notions of Plato's *Leges* 2 and Aristotle's *Politica* 8. Both of these refer to the lively nature of children and the value of music in their education. Section 4 introduces the reason for the force of music, or its actuality: mimesis (μίμησις), the leading concept in musical education and inextricably related to the notion of similarity (ὁμοιότης). Because of the natural attraction of the soul to something that is like to one or another of its parts,[124] mimetic arts may affect the soul on earth for better or worse. Mimesis in music is not simple imitation of things but rather is an imitation of life itself, capable of raising the soul once again to the harmonia of the universe. This is why it is the most powerful art, as Aristides Quintilianus observes, "since it makes its mimesis not through one sensory perception but through many."[125] As the most powerful art, it must especially be a part of the education of children because of the role of habituation (συνήθεια) in education, and the need for music to be controlled in Plato's ideal state is therefore quite apparent.[126] The conclusion of section 4, which deals with the application of music in life's activities and the relationship of music with moods, including divine suffusion, appears to be related especially to Aristotle's *Politica* 8.7.

---

[122] On the ruling power of the soul, cf. Plotinus *Enneades* IV.7.[2], ch. 8^{4}; on the Ideas, cf. Plotinus V.9.[5].

[123] Cf. Plotinus *Enneades* IV.1–5.[21, 4, 27, 28–29]. See Mathiesen, *AQ on Music*, 115–17.

[124] Cf. Plato *Timaeus* and *Sophist;* Aristotle *Metaphysica* 1.6.

[125] οὐ διὰ μιᾶς αἰσθήσεως, διὰ πλειόνων δὲ ποιουμένη τὴν μίμησιν (W.-I. 56.11–12). Cf. Aristotle *Poetica* 1 (1447b24–29).

[126] Cf. Plato *Respublica* 3.8 (395d), 7.6 (522a); *Leges* 2 (668a–671d; n.b. 669b–d). The subject of mimesis is philosophically complex and the literature dealing with it is considerable. In addition to the works cited in n. 119 *supra,* useful treatments will be found in S. H. Butcher, "'Imitation' as an Aesthetic Term," in *Aristotle's Theory of Poetry,* 121–62; Werner Jaeger, *Paideia: Die Formung des griechischen Menschen,* 2d ed. (Berlin: W. de Gruyter, 1936); and H. I. Marrou, *Histoire.* See Mathiesen, *AQ on Music,* 117–20.

Section 5 delineates the therapeutic power of music. Each of the parts of the soul—the epithymetic and thymic parts of the irrational and the rational part itself—is associated with a mood: the epithymetic with pleasure (ἡδονή), the thymic with pain (λύπη) and anger (ὀργή), and the rational with divine suffusion (ἐνθουσιασμός). For each of these, a mode might be applied to lead the mood back to a correct condition by means of mimesis.[127]

All this leads to section 6, where it is concluded that the ancients (here clearly Plato) believed it necessary to practice music throughout life and establish certain mele, which they called "nomoi."[128] Still, the ancients were concerned that just the right balance and type of musical study be pursued, lest men develop an improper ethos.[129] Some, according to Aristides Quintilianus, did not understand Plato's views in the *Respublica* and so banished music altogether from the ideal state; others believed Plato intended to banish only those sorts of mele associated with pleasure. But Aristides Quintilianus proposes that Plato would allow music for amusement as well as for paideutic purposes, pointing out that amusement and paideia are not mutually incompatible: "For neither is every enjoyment contemptible nor is enjoyment the end of music, but rather amusement arises as a contingent attribute and the object that precedes is its benefit to virtue."[130]

Aristides Quintilianus bolsters the accuracy of these ancient notions not with additional ancient authority but rather by turning to a more contemporary example: Rome. As is his usual practice (especially necessary here because of the sudden shift from Hellenic ideals to Roman history), he links this material with the previous. Some, he has said, did not understand Plato's views; now he adds that this number includes Cicero himself (in his own *De re publica*[131]), who "reviles music and censures it as inferior," except when it suits his purposes, as in his defense of Roscius the dancer: then, he praises the dancer as having "passed into mankind with the foreknowledge of the gods."[132] A shift of focus to Rome having been accomplished, Aristides Quintilianus then observes that music has always played an important role in Rome, first helping to educate Romans in the time of Numa (trad. 715–673 B.C.E.), later serving prominently in the military in the form of musical codes that allowed commands to be conveyed secretly and at once, and of greatest importance, rearing refined men to serve as leaders of the Republic.

---

[127] This section again reflects Aristotle's *Politica* 8.7 and also the Theophrastus fragment preserved in Plutarch's *Quaestiones convivales* 1.5.2 (623a–d), where the same three moods are introduced. On this passage, see Hermann Abert, *Die Lehre vom Ethos in der griechischen Musik* (Leipzig: Breitkopf und Härtel, 1899; reprint, Tutzing: Hans Schneider, 1968), 18 and 25; and Mathiesen, *AQ on Music*, 121–22.

[128] See pp. 58–71 *supra*.

[129] Plato *Respublica* 3.10; *Leges* 7 (799e–800a), 3 (700b), 4 (722d–e), and 5 (734e).

[130] οὔτε γὰρ ἅπασα τέρψις μεμπτὸν οὔτε τῆς μουσικῆς αὕτη τέλος, ἀλλ' ἡ μὲν ψυχαγωγία κατὰ τὸ συμβεβηκός, σκοπὸς δὲ ὁ προκείμενος ἡ πρὸς ἀρετὴν ὠφέλεια (W.-I. 60.29–61.3). Cf. Plato *Respublica* 3.10; *Leges* 2 (658e–6659c) and 7 (802a–e). See Mathiesen, *AQ on Music*, 122–24.

A consideration of the effect of music on character and the way in which entire peoples reflect their musical culture rounds out Aristides Quintilianus's explication of the paideutic force of music.[133] The two passions (πάθη) of the irrational part of the soul—spirit (θυμός) and desire (ἐπιθυμία)—may be led to flawed and undesirable ethoses or may be delighted and reformed. This latter state is expressly ascribed by Aristides Quintilianus to the Greeks, although by mentioning the reform of entire cities and peoples, the Romans are also implied through his previous example.[134]

---

[131] Cicero's *De re publica* exists only in fragment; the section on music is not preserved. For reference to an edition and translation, see chapter 2, n. 220 *supra*.

[132] μουσικὴν λοιδορεῖν τε καὶ ὡς φαύλην εὐθύνειν ... αὐτὸν προνοίᾳ θεῶν ἐς ἀνθρώπους περελθεῖν (W.-I. 61.7–8, 12–13). Aristides Quintilianus employs heavy irony worthy of Cicero himself when he describes the speaker in *De re publica* as "the one speaking against music in the *Republic* of the Roman Cicero; I, for my part, would not say that such things have been said by Cicero" (τὸν ἐν τοῖς Κικέρωνος τοῦ Ῥωμαίου Πολιτικοῖς τὰ κατὰ μουσικῆς ῥηθέντα· οὐ γὰρ ἔγωγ' ἂν φαίην ἐκείνῳ τὰ τοιαῦτα εἰρῆσθαι [W.-I. 61.4–6]). An oration in defense of Roscius exists only as a fragment, in which the passage recalled by Aristides Quintilianus is not preserved—if in fact it was originally a part of this oration (for a text and translation, see *Cicero in Twenty-Eight Volumes*, vol. 6, *Pro Publio Quinctio, Pro Sexto Roscio Amerino, Pro Quinto Roscio comoedo, De lege agraria I., II., III.*, trans. John Henry Freese, Loeb Classical Library [Cambridge: Harvard University Press, 1930], 274–327).

[133] Probably based on Plato's comments in *Respublica* 4.11 (435e–436a) or a commentary on this passage.

Now the conclusion of the first part of Book II is drawn: music is the most powerful paideutic force, beginning from the earliest age; music molds ethos and may also be used as a means of determining ethos; music is, therefore, useful and must be taught to the young and to those of every age. This conclusion directly answers the first three questions put at the beginning; questions 4 and 5 have been answered in the course of the treatment but are not specifically recalled here. As is usual in Aristides Quintilianus's conclusions, similes and metaphors are introduced—along with an abundance of expressive adjectives—to give the summation special power and beauty.[135]

The second part of Book II (sections 7–16) deals with what Aristides Quintilianus calls "the perfect actuality of music," which is defined as "a suitable notion ..., seemly diction, a scale akin, harmonia of notes, qualities of rhythm, and use of instrument ... made homologous."[136] This part builds directly on the first part of Book II—for its discussion of notion—and on all of Book I in its discussion of diction[137] (based on 1.20–21), scale, harmonia, and rhythm (based 1.6–29). The comments on instruments introduce a new application of the previous material and lead directly into the third part of Book II, which focuses specifically on instruments. The second and third parts of Book II together provide a full consideration of the expression class (instrumental, odic, and theatric) of the practical division of music—one of the two classes not discussed in Book I.

---

[134] See Mathiesen, *AQ on Music*, 126–27.

[135] Ibid., 127–28.

[136] Ἐν τελείᾳ δὴ μουσικῆς ἐνεργείᾳ καὶ ἔννοια λαμβάνεται πρόσφορος καὶ λέξις πρέπουσα καὶ σύστημα παραπλήσιον καὶ ἁρμονία φθόγγων καὶ ῥυθμοῦ ποιότητες καὶ ὀργάνου χρῆσις ὁμολογουμένη (W.-I. 85.21–24). For Aristides Quintilianus, "actuality" is achieved form and its attendant power; thus, the perfect actuality of music is a transcendent perfect Idea-Form of music, not simply a piece of music on earth. The conception is probably derived from Plotinus *Enneades* II.5.[25] or IV.7.[2], ch. 8^3, but it may also come from Porphyrius *Sententiae* (xli, p. 40,6).

[137] By "notion" (ἔννοια), Aristides Quintilianus means a leading concept held in the mind, governing action or the creation of art. Notions are intellections of intangibles and are therefore higher than conceptions, which relate to the mental constructions of tangibles (cf. Plato *Timaeus* 47a, *Philebus* 59d, and *Phaedo* 73c; and Aristotle *Ethica Nicomachea* 10.9 [1179b15] and *Metaphysica* 12.8 [1073b12]). "Diction" is the fourth part of tragic composition (Aristotle *Poetica* 6 [1450a9]), discussed at length by Aristotle in *Poetica* 19–22 (1456b8–1459a16).

The pattern of this part follows that of the first part. Just as Aristides Quintilianus began the first part with an overview of its subject (in the form of questions), so here he begins with his definition of the relationship of notion, diction, harmonia, and rhythm. Likewise, just as the questions of the first part were deferred for an explication of the soul because the soul is the base of musical paideia, so here a section on the soul is introduced because the soul, when contained by a body, is the seat of the passions, which in turn affect and are affected by the notions.

Section 8 recalls some of the characteristics of the soul earlier delineated in sections 2 and 3, and the sources are no doubt largely the same. But in this section, Aristides Quintilianus concentrates on the dual nature of bodies, and this specifically calls to mind the *Symposium* (187–193) of Plato and the discussions of the soul in Plotinus (*Enneades* IV.7.[2]). The soul takes on certain masculine characters, certain feminine characters, and sometimes a certain mixture of characters,[138] characters basically following the natures set out at great length by Plato in the *Leges* and *Respublica*. Because characters differ, notions predicated on these characters will also differ. Aristides Quintilianus has earlier observed (2.4) that will (βουλή) is the primary operative force in life and music imitates the characters and passions of life through its notions. Therefore, the training of notions is of paramount importance since these affect in turn the soul's ethos.

The next two sections, 9 and 10, discuss at considerable length the shaping of notions through ethical education. There are two classes of ethical education: the therapeutic (θεραπευτικόν), subdivided into the meiotic (μειωτικόν) and the anairetic (ἀναιρετικόν) species;[139] and the opheletic (ὠφελητικόν), subdivided into the diateretic (διατηρητικόν) and the prosthetic (προσθετικόν) species. The four processes are then demonstrated in fourteen Homeric passages subjected to critical analysis. The purpose of this is to show ways in which the notions can be developed by applying literary devices, or tropes (such as epithets, metaphors, similes, periphrases, etc.), to specific concepts in odic expression, one of the subclasses of the practical division of music. Each of the literary devices demonstrates one or more of the processes of ethical education.[140]

---

[138] See Mathiesen, *AQ on Music*, 129–31.

[139] These two techniques—diminution and transference—are still commonly used in modern psychiatry.

It is difficult to determine Aristides Quintilianus's sources for this section of literary criticism, but it may be reasonably assumed that the technical exegeses derived from works such as those by Dionysius of Halicarnassus and Hephaestion—rather than the earlier works of Aristotle and Theophrastus—and the allegorical interpretations (which appear chiefly in section 17) from works such as the *Quaestiones Homericae* and Porphyrius's *De antro nympharum*.

Aristides Quintilianus joins the next topic (section 11) to the previous by continuing the use of quotation. Here Aristophanes, "the most cheerful of the comic poets" (ὁ φαιδρότατος τῶν κωμικῶν), is introduced to divert the discourse to the topic of diction. The elements, which were introduced in Book I where they had been described chiefly by their measure, are now described by their sounds,[141] which will be used in the ensuing section to assign them masculine and feminine characteristics.

Sections 12–14 take the technical discussions of Book I on notes, intervals, and scales and associate these with the masculine, feminine, and medial characters developed to this point. Certain notes are distinguished as masculine, others as feminine, and still others as a mixture of both. These same qualities may then be applied to intervals and to scales. The genders of notes are identified by first assigning genders to the seven vowels and then by associating the notes of the tetrachord with four of the vowels—epsilon, alpha, eta, and omega—through a system of solmisation. The four vowels are characterized, respectively, as medial (but more feminine), medial (but more masculine), feminine, and masculine; to each a tau is added, apparently to facilitate the actual singing of the solmisation. Thus, the entire Perfect System can be solmised as follows:[142]

---

[140] See Mathiesen, *AQ on Music*, 131–39.

[141] Ibid., 139–40.

[142] The solmisation is also exhibited in Bellermann's Anonymous 2.77 (Najock 126.1–128.4), but with τω as the syllable for the proslambanomenos. Bellermann's Anonymous 2.86–92 (Najock 140.1–142.6) actually employs the solmisation to illustrate certain musical gestures.

proslambanomenos	τε		
hypate hypaton	τα		
parhypate hypaton	τη		
lichanos hypaton	τω		
hypate meson	τα		
parhypate meson	τη		
lichanos meson	τω		
mese	τε	mese	τα
paramese	τα	trite synemmenon	τη
trite diezeugmenon	τη	paranete synemmenon	τω
paranete diezeugmenon	τω	nete synemmenon	τα
nete diezeugmenon	τα		
trite hyperbolaion	τη		
paranete hyperbolaion	τω		
nete hyperbolaion	τα		

Figure 88.

In the diatonic genus, with the exception of the interval between alpha and eta, all the solmised intervals are whole-tones. Although not stated at this point in the treatise, Book III, section 21 makes it clear that the syllable applied to the mese depends on its movement: if it falls within the synemmenon tetrachord, it must be solmised with τα; otherwise, it will be solmised with τε.[143] From the characters assigned to these syllables, it follows that certain scales, modes (τρόποι), and instruments will be masculine, feminine, or medial depending on their emphasis on certain genders of notes (though the gender of instruments is also affected by other factors, which are discussed in sections 16–19 of Book II), and they may therefore be used—following the four processes of ethical education—to affect ethos.[144]

"The disciples of Damon" (οἱ περὶ Δάμωνα), which surely included Plato, are named in section 14, and the Damonian source of Aristides Quintilianus's treatment of the ethical force of notes, intervals, and harmoniai has accordingly been discussed at length by many commentators. It remains impossible to draw definite conclusions,[145] yet it is clear at least that these concepts introduced by Aristides Quintilianus provide the structural link between the technical considerations of Book I (in the technical and application classes of the theoretical and practical divisions of music) and all of Book III, which will deal with the natural class of the theoretical division of music as the capstone of the treatise.

---

[143] This system, with its single pair of syllables surrounding the semitone and its doubly inflected mese, bears a striking resemblance to medieval hexachord solmisation.

[144] See Mathiesen, *AQ on Music*, 140–46.

Section 15 deals with the last of the parts of "the perfect actuality of music" derived from Book I: rhythm. The different rhythmic patterns laid out at length in Book I are not repeated here; instead, the rhythmic ratios—simple and composite—are associated with affective qualities. The assignment of these qualities is supported in this instance with a medical analogy to pulse beats and observations of character exhibited in, as Aristides Quintilianus puts it, "the modes of walking" (αἱ πορεῖαι)—a particularly apt parallel for rhythmic patterns. So, those (rhythms or persons) stepping equally with goodly length are orderly and manly in ethos, those stepping equally but with quite little steps are lowly and ignoble, and so on.[146]

The final section of the second part of Book II touches on delivery (ὑπόκρισις) (i.e., the forms or poses set by the body to support each of the notions expressed in the music) and the masculine, feminine, and medial characters of instruments used in the accompaniment of song.[147] The brief sentences on delivery simply point out that the mimeses of bodily motions can help to instill dignity and manliness. The importance of bodily motion in musical expression has already been introduced by Aristides Quintilianus: this is in fact one of the subclasses, the theatric, of the expression class of the practical division of music. The theatric subclass is defined (1.5) as that "in which bodily motions homologous to the underlying mele are also employed."[148] Each of the forms is later (1.14) associated with the other smallest units of rhythm, melos, and diction. Speaking of the protos chronos, Aristides Quintilianus comments: "it is considered in diction in respect to the syllable, in melos in respect to the note or one interval, and in motion of body in respect to one form."[149] The visual aspect of bodily movement makes its mimetic force especially strong, and Aristides Quintilianus's treatment reflects the substance of Plato's *Leges* 7 (814e–816e) quite clearly.[150]

---

[145] See n. 119 *supra* and Robert W. Wallace, "Damone di Oa ed i suoi successori: Un'analisi delle fonti," in *Harmonia mundi: Musica e filosofia nell'antichità: Music and Philosophy in the Ancient World,* ed. Robert W. Wallace and Bonnie MacLachlan, Biblioteca di Quaderni urbinati di cultura classica, vol. 5 (Roma: Edizioni dell'Ateneo, 1991), 30–53.

[146] See Mathiesen, *AQ on Music,* 146–48.

[147] The subject is treated in Pickard-Cambridge, *Dramatic Festivals,* 126–35 and 156–76. See Mathiesen, *AQ on Music,* 148–51.

Instruments must also be considered in a study of music's actuality because the ethos of each instrument will have an effect on the listener. Since particular qualities have already been associated with the masculine, feminine, and medial characters, it is a simple matter for Aristides Quintilianus to observe which instruments are masculine (because vehement, grave, or rugged), feminine (because mournful or high-pitched), and medial. Only a few instruments are specified,[151] but the others are not difficult to categorize, Aristides Quintilianus notes, because "we have in general the characteristics by which we shall subjoin the particular instruments."[152] Instruments must be selected so that the natures of the harmoniai, rhythms, and the instruments themselves are compatible.

The second part of Book II concludes with the observation that the purest forms must sometimes be modified lest the extreme—through contrariety[153]—lead ethos in a direction opposite to the goal. Medial forms, however, can be safely employed for effective ethical education, and in the course of the second part, Aristides Quintilianus provides a full discussion of the expression class of the practical division of music: instrumental expression in sections 16–19 (together with a brief reference to theatric expression in section 16) and odic expression in sections 9 and 10. This is fully appropriate within the Book on the educational force and value of music, for as Aristides Quintilianus has earlier said (1.5), the practical division is also called the educational.

---

[148] ἐν ᾧ λοιπὸν καὶ σωματικαὶ κινήσεις ὁμόλογοι τοῖς ὑποκειμένοις μέλεσι παραλαμβάνονται (W.-I. 6.22–24).

[149] θεωρεῖται γὰρ ἐν μὲν λέξει περὶ συλλαβήν, ἐν δὲ μέλει περὶ φθόγγον ἢ περὶ ἓν διάστημα, ἐν δὲ κινήσει σώματος περὶ ἓν σχῆμα (W.-I. 32.16–18).

[150] Cf. Plato *Leges* 2 (654e–657a, 668b–671b) and 7 (795e–796d).

[151] See pp. 161–62 *supra*.

[152] ἐχόντων ἡμῶν καθόλου χαρακτῆρας οἷς τὰ καθ' ἕκαστον ὑποτάξομεν (W.-I. 85.16–17).

[153] Cf. Aristotle *Metaphysica* 10.4, 7–10 and *Ethica Nicomachea* 2.8 (1108b27–35); and Plato *Theaetetus* 186.

By concluding the second part with a brief study of instruments, Aristides Quintilianus links this part to the third, which deals with the question why instruments have so great a power over the soul. The pattern is once again the same: the question is deferred until the soul, which "is moved naturally by music through instruments,"[154] is subjected to its third analysis.

Two arguments on the soul are introduced; the first posits "the soul is a certain harmonia and harmonia exists through numbers."[155] Because music is also organized by numbers, the passions are moved through mimesis or sympathy. This argument is postponed to a later time—in fact, to Book III.[156] The second argument proposes that an instrument possesses a specific nature because of its conjunction with a soul. The conjunction of the soul and the body is then explored in a passage of considerable poetic beauty that may derive from Plotinus and Porphyrius[157] and is in any case certainly highly reminiscent of Plato's *Timaeus*. Each of Aristides Quintilianus's three treatments of the soul becomes progressively more complex and poetic. In this treatment, the actual construction of the body is delineated: the lines of the planetary orbits are plaited into a latticework of strands (or arteries), the surfaces of the orbits become membranes, and the aeroid breath of the earthly region is infused. The concept is then supported with four allegorical interpretations of Homer, two fragments from Heracleitus, and a medical explanation.[158]

---

[154] ὅτι μὲν γὰρ ψυχὴ κινεῖται φυσικῶς ὑπὸ τῆς δι' ὀργάνων μουσικῆς (W.-I. 86.14–15).

[155] ἁρμονία τις ἡ ψυχὴ καὶ ἁρμονία δι' ἀριθμῶν (W.-I. 86.20–21).

[156] The argument follows Plato *Phaedo* 86c (cf. with 92–94) and *Timaeus*; and Aristotle *Politica* 8.5 (1340b18–19) and *De anima* 1.4.

[157] Plotinus *Enneades* IV.8.[6]; IV.3.[27]; V.2.[11]; IV.7.[2]; and Porphyrius *Sententiae* 32. See also Andrew Smith, *Porphyry's Place in the Neoplatonic Tradition: A Study in Post-Plotinian Neoplatonism* (The Hague: Nijhoff, 1974), 1–19. A. J. Festugière ("L'Âme et la musique d'après Aristide Quintilien," *Transactions of the American Philological Association* 85 [1954]: 55–78) provides an incisive study of this part of the treatise and notes many additional parallels, including the *Corpus Hermeticum* and Proclus's commentary on the *Timaeus*.

With this construction, Aristides Quintilianus observes that instruments themselves are similarly caused to sound: string instruments with strands, wind instruments with breath. Therefore, the soul will naturally experience sympathetic responses to instruments, and this is proven with an example of the sympathetic vibration of strings.[159] The two types of instruments are then assigned the same sort of ethical characters earlier associated with the other parts of musical actuality. Because the string instruments represent the higher regions (through their relation to the lines of the planetary orbits), they are better; the wind instruments resemble the lower regions (through their use of breath) and so are inferior. This demonstrates, as Aristides Quintilianus observes, the famous legend of the contest between Apollo and Marsyas.[160]

In the final section, the characters and the instruments themselves are associated with various mythic figures such as the muses, Apollo, and Athena, who typify the differing passions and ethoses, and thus the discussion of the ethico-paideutic force and value of music is concluded.[161] With the introduction of music's relationship to the planetary spheres in the concluding part of Book II, Aristides Quintilianus gives a foretaste of the subject and approach of Book III.

The third book of the treatise deals with the remaining class of the two divisions introduced in Book I, section 5: the natural class of the theoretical division. As this class was in turn divided into the arithmetic subclass and the natural subclass, Book III is divided into two large parts paralleling these subclasses, the first part occupying sections 1–8, the second comprised of sections 9–27. For their exposition, these sections draw upon the phenomena exposed in Book I and their ethico-paideutic force delineated in Book II. Here, the author finally reaches the capstone of his work, the ultimate goal of music, foretold in the proem:

---

[158] See Mathiesen, *AQ on Music*, 151–54. In the medical explanation, Aristides Quintilianus refers to the common Greek medical opinion that the soul moved through the arteries, which contain breath (see Guido Majno, *The Healing Hand: Man and Wound in the Ancient World* [Cambridge: Harvard University Press, 1975], 330–37).

[159] The notion of cosmic sympathy may derive from Plotinus *Enneades* IV.3.[27], ch. 11; IV.4.[28], chs. 40–41. Cf. Plato *Phaedo* 92–94. Porphyrius (*Ad Gaurum* 11.4) also describes the phenomenon of sympathetic resonance. Evanghélos Moutsopoulos explores the subject in "Μουσικὴ κίνησις καὶ ψυχολογία ἐν τοῖς ἐσχάτοις Πλατωνικοῖς διαλόγοις," *Athena* 64 (1960): 194–208; and "Sur la 'participation' musicale chez Plotin," *Philosophia* 1 (1971): 379–89.

[160] See pp. 179–82 *supra*.

[161] See Mathiesen, *AQ on Music*, 155–57.

> But for those still older, it [music] explains both the nature of numbers and the variety of proportions; it gradually reveals the harmoniai that are, through these, in all bodies; and most important and most perfect and concerning a thing difficult for all men to comprehend, it is able to supply the ratios of the soul—the soul of each person separately and, as well, even the soul of the universe.[162]

The nature of numbers and variety of proportions is the subject of the first part of Book III, while the harmoniai of bodies and the ratios of the soul are treated in the second part.

The first part of Book III begins (sections 1–5) by offering a discussion of the various arithmetic demonstrations of musical intervals, which is intended "to make each of the intervals in music clear by strict perception through numbers."[163] In this way, material from the technical class of the theoretical division (in Book I) is raised to the abstract level of the natural class since the natural order and power of numbers is axiomatically assumed. Many of the traditional numerical demonstrations are surveyed here, including (1) weights suspended from strings;[164] (2) the usual arithmetic determinations of the ratios of tones, semitones, and dieses, and of the interval content of the fourth; (3) monochord divisions; (4) the helicon, although with no mention of Ptolemy; (5) plane figures; and (6) arithmetic, geometric, and harmonic proportions. Each of the demonstrations is quite clearly presented in the treatise,[165] and, except for the first, none presents any unusual physical or mathematical difficulties.

---

[162] προϊοῦσι δὲ τήν τε τῶν ἀριθμῶν ἐξηγουμένη φύσιν καὶ ἀναλογιῶν ποικιλίαν, ἁρμονίας δὲ τὰς διὰ τούτων ἐν πᾶσι σώμασιν ὑποφαίνουσα, τὸ μέγιστον ⟨δὲ⟩ δὴ καὶ τελεώτατον καὶ περὶ τοῦ δυσκαταλήπτου πᾶσιν ἀνθρώποις ψυχῆς τῆς τε καθ' ἕκαστον, ἤδη δὲ καὶ τῆς τοῦ παντὸς λόγους ἔχουσα παρασχέσθαι (W.-I. 2.11–17).

[163] ἀτρεκεῖ καταλήψει τῇ δι' ἀριθμῶν ἕκαστον τῶν ἐν μουσικῇ διαστημάτων σαφηνίζειν ἐπενόησαν (W.-I. 94.9–11).

[164] The demonstration is associated with Pythagoras in Nicomachus *Manuale harmonices* 6, but Aristides Quintilianus does not attribute it to Pythagoras here. See pp. 399 and 503–4 *supra*.

The source or sources for these demonstrations are uncertain because most of them appear so often in so many different combinations. There are, however, three sources that contain the majority of the demonstrations. The first of these is Plutarch's *De animae procreatione in Timaeo,* which includes the identical plane figures as well as some additional material paralleling passages in later sections of Book III (for instance, sections 12 and 19). This commentary might well have been a principal source for Aristides Quintilianus; in fact, Plutarch is almost certainly the source for the quotation at the very end of Book III, thus emphasizing Aristides Quintilianus's familiarity with this author. The description of the helicon probably came from Porphyrius's commentary on Ptolemy's *Harmonica,*[166] and the description of the monochord—as well as several of the other demonstrations—is most likely derived from Theon of Smyrna's *Expositio rerum mathematicarum ad legendum Platonem utilium.*[167] That Theon's *Expositio* was used by Aristides Quintilianus is further supported by some striking similarities between Theon's introduction and the first part of Book III of Aristides Quintilianus's treatise, particularly in the Platonic and Pythagorean references. Moreover, Theon's references to initiation into the Mysteries parallel Aristides Quintilianus's own references in the second part of Book III.[168]

The first four demonstrations lead Aristides Quintilianus (section 4) to question why, since there are so many intervals, only certain intervals are considered consonant. The answer is given in the next two demonstrations where the numbers and proportions of the first four demonstrations are related to plane figures (section 4) and from there to proportions and solids (section 5). According to the argument, because only certain of the numbers and proportions can be related to primary geometric figures, only certain intervals can be considered consonant in nature. These two demonstrations are necessary steps (and are the next logical steps) because they lead the abstraction of the numbers to the metaphysical geometric forms that will be used for the model of the universe in the next part of Book III. Aristides Quintilianus describes the formation of the plane figures as follows:

---

[165] See Mathiesen, *AQ on Music,* 159–67.

[166] Porphyrius *In Ptol. Harm.* 2.2 (Düring 157.11–20).

[167] Theon *Expositio* (Hiller 87–93). See pp. 422–24 *supra.*

[168] See pp. 414–15 *supra.*

> Since the perfect scale is considered in duple ratio, and this is resolved into the sesquialteran and sesquitertian ratio, we determine in numbers the first sesquialteran, three, the first perfect among numbers; and the first sesquitertian, four, the first plane in geometry. We set forth straight lines equal to these numbers cutting one another at right angles, of which the one line to its part will have the sesquialteran ratio, the other, the sesquitertian.[169] Since we have determined points on the lines by the underlying monads, if we should conduct parallels, a whole area in one way is produced for us from twelve monads as we set forth the ratios in accord with geometry; and in another way, in accord with arithmetic, the complement of the perfect numbers will be demonstrated upon thirty-five monads. Each of the parallelograms comprised of the parts of crosswise straight lines and of the whole line and its part[170] will demonstrate the aforesaid ratios of the consonant intervals and neither more nor less than these.[171]

Although the figures themselves are not preserved in the manuscripts, the same figures are described in Plutarch's *De animae procreatione in Timaeo* 1018a–b, and they can easily be reconstructed:

---

[169] These are lines A and B in figure 89. The characterizations of the numbers follow Theon *Expositio* (Hiller 46.14–19; 26.14–18).

[170] That is, lines A, B, C, and D. The parts of the crosswise lines are demonstrated in the smaller figure; the whole lines and their parts are demonstrated in the larger figure, which also embodies the smaller figure and all its complements. The four segments of the larger figure also demonstrate the famous Pythagorean harmonia of 6:8:9:12 (see pp. 363 and 394 *supra*). The number 35 (represented in the larger figure) will be important in the cosmological demonstrations later in Book III.

[171] ἐπεὶ τοίνυν τὸ σύστημα τὸ τέλειον ἐν διπλασίονι θεωρεῖται λόγῳ, οὗτος δ' ἀναλύεται εἴς τε τὸ ἡμιόλιον καὶ ἐπίτριτον, λαμβάνομεν ἀριθμοὺς ἡμιόλιον μὲν πρῶτον τὸν τρία καὶ τέλειον πρῶτον ⟨ἐν⟩ ἀριθμοῖς, ἐπίτριτον δὲ πρῶτον τόν τέσσαρα καὶ πρῶτον ἐπίπεδον ἐν γεωμετρίᾳ, τὰς τούτοις ἴσας εὐθείας τεμνούσας ἀλλήλας πρὸς ὀρθὰς ἐκτιθέμεθα, ὧν ἡ μὲν πρὸς τό αὐτῆς μέρος τόν ἡμιόλιον λόγον, ἡ δὲ τὸν ἐπίτριτον ἕξει. καὶ δὴ σημείων ἡμῖν ἐν αὐταῖς ληφθέντων κατὰ τὰς ὑποκειμένας μονάδας εἰ παραλλήλους ἀγάγοιμεν, τὸ μὲν ὅλον ἡμῖν ἐμβαδὸν πῆ μὲν δώδεκα γίνεται μονάδων κατὰ γεωμετρίαν τοὺς λόγους ἐκτιθεμένοις, πῆ δὲ κατὰ ἀριθμητικὴν τριακονταπέντε τελῶν τὸ τῶν ἀριθμῶν σύμβολον καταδειχθήσεται· ἕκαστον δὲ τῶν ὑπὸ τῶν μερῶν τῶν εὐθειῶν ἐναλλὰξ καὶ ὑπὸ ὅλης καὶ μέρους περιεχομένων παραλληλογράμμων τοὺς προειρημένους τῶν συμφώνων διαστημάτων ἐπιδείξει λόγους καὶ οὔτε πλείους τούτων οὔτε ἐλάττους (W.-I. 99.29–100.15).

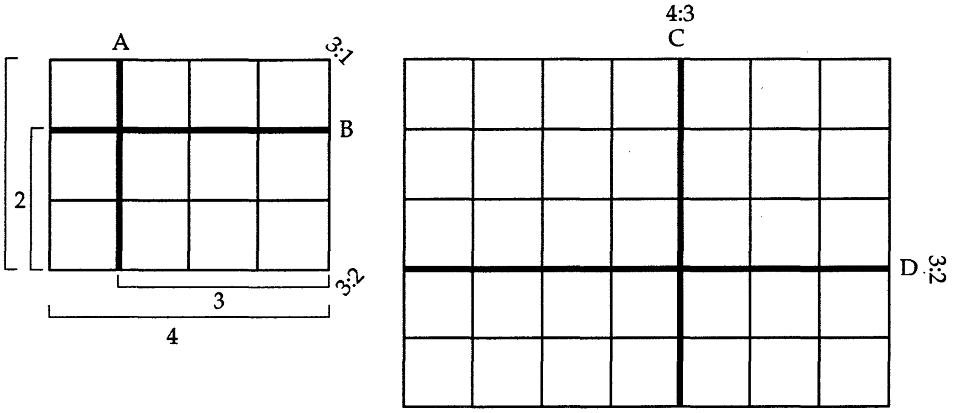


Figure 89.

Building on the proportions described in section 4, Aristides Quintilianus explains the mathematical characteristics of the three means (arithmetic, geometric, and harmonic), although his method for determining the harmonic mean differs somewhat from the descriptions found in Nicomachus's *Manuale* or Theon of Smyrna's *Expositio*.[172] In order to be able to relate these means more closely to the squares and cubes described in Plato's *Timaeus*, he describes the harmonic mean as the result of inserting arithmetic means in the middle of a geometric proportion and accordingly lays out the plane geometric proportion of 2:4:8 (based on squares) and the solid geometric proportion of 3:9:27 (based on cubes). Then, by inserting arithmetic means between each of the terms, he produces the plane proportion 2:3:4:6:8, in which 4 is the harmonic mean between 3 and 6, and the solid proportion 3:6:9:18:27, in which 9 is the harmonic mean between 6 and 18. Two additional harmonic means, 4 and 12, can be inserted within this proportion to produce the "musical, solid proportion" (μουσικὴ στερεὰ ἀναλογία) of 3:4:6:9:12:18:27, although Aristides Quintilianus does not describe how these additional means could have been determined by using his method. The entire complex embodies all the proportional types and the various consonances:

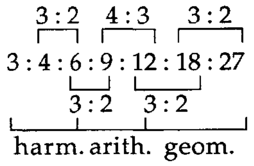


Figure 90.

---

[172] See pp. 362–63, 400–401 (and n. 81), 422, and 426–27 *supra*.

The same definitions of numbers and the same (or similar) definitions of proportions are also found in Theon's *Expositio* (Hiller 46; 35; and 113–19). All this material is Platonic, and indeed all of Book III of Aristides Quintilianus's treatise is closely related to the notions of Plato's *Timaeus* and the "Myth of Er" in Book X of Plato's *Respublica*.

In section 6, the first twelve numbers are given specific associations that will later be involved in Aristides Quintilianus's metaphysical demonstrations in the second part of Book III. The first ten, of course, form the decad, which was of great symbolic importance to the Pythagoreans and Platonists. According to Theon of Smyrna, it contained "in itself the nature of both even and odd, of that which is in motion and that which is motionless, of good and of evil."[173] The associations assigned to the numbers are clearly derived from ancient sources, as is seen in Aristides Quintilianus's constant references to "they" and "them," and in view of the earlier apparent uses of Theon, it seems likely that here too he is one of the sources for these characterizations:

1	beginning of the concord of the whole universe and creative cause
2	matter
3	the universe
4	the solid
5	sensory perception
6	perfection of body, or marriage[174]
7	chastity
8	material body
9	music
10	the first concord

Figure 91.

Aristides Quintilianus adds two numbers to this group because his later treatments will draw heavily on the number 12. No particulary good association would seem to have come to mind in connection with the number 11: Aristides Quintilianus simply associates it with the ratio 12:11, the remainder when the diesis 33:32 is subtracted from the tone. The number 12, however, he characterizes as "the most musical of the numbers" (μουσικώτατος ἀριθμῶν), for this one can be arrayed in the proportion 12:9:8:6:4:3, which embodies all the familiar Pythagorean consonances, as well as the 9:8 tone.[175]

---

[173] ἡ μέντοι δεκὰς πάντα περαίνει τὸν ἀριθμόν, ἐμπεριέχουσα πᾶσαν φύσιν ἐντὸς αὑτῆς, ἀρτίου τε καὶ περιττοῦ κινουμένου τε καὶ ἀκινήτου ἀγαθοῦ τε καὶ κακοῦ (Hiller 106.7–10). The decad is only one of eleven forms of the tetraktys discussed by Theon (see pp. 424–26 *supra*).

[174] On 6 as the marriage number, see Plato *Respublica* 8.3 (546b–d). McClain, "Musical 'Marriages'," 242–72, provides an interesting study of this passage.

Section 7 provides Aristides Quintilianus's defense against the anticipated charge of inconsistency for proposing to expound musical nature precisely through numbers while at the same time suggesting (in sections 2–3) that some musical intervals may be irrational. The resolution of this seeming paradox, he asserts, lies in the fact that the actual instruments on which intervals may be sounded are merely a poor imitation of their perfect metaphysical counterparts, which do embody the perfection of number. Moreover, worldy perceptions are also hampered by their surroundings and cannot offer true understanding. Thus, he concludes:

> music itself also has a beginning from the whole universe, just like other things—to speak in a not unconvincing manner—and by its mixture with bodily matter falls away from its precision and excellence in numbers, since at least in the regions above us, it is strict and incorruptible. So also we are powerless to make the divisions of the intervals equal, and we have defective consonances of scales because our bodily density is a hindrance.[176]

These notions could be derived from any number of sources, but the presence in this section of the analogy with the sculptor calls to mind Plotinus's *Enneades* V.8.[31], ch. 1, while the duality of regions, the unreliability of perceptions, and the function of mimesis suggests *Enneades* II.1.[40], Plato's *Phaedrus* and *Respublica* 10.1–3, and Aristotle's *Metaphysica* 1.6 (987b).

The first part of Book III draws to a close in section 8 as Aristides Quintilianus supports the association of music and numbers through a series of parallels drawn from painting, medicine, social ethos, and political structure. These are important not only because they supply additional evidence but also because they provide a way of linking this first part of Book III through parallel subjects to Books I and II: painting was introduced in Book I, section 1, and Book II, section 4; medicine was used for analogy in Book I, section 2, and Book II, sections 6, 15, and 16; considerations of ethos occupied much of Books I and II; and the political structure of Rome was noted in Book II, section 6. In this way, Aristides Quintilianus shows the clear relationship of the arithmetic subclass of the theoretical division of music to all the other classes previously treated.[177]

---

[175] For fuller explanations of the numbers and their meanings, see Mathiesen, *AQ on Music*, 167–69.

[176] μουσικὴν δὴ καὶ αὐτὴν ἀρχὴν μὲν ἔχειν ἐκ τῶν ὅλων, ὥσπερ καὶ τὰ ἄλλα, εἰπεῖν οὐκ ἀπίθανον, τῇ δὲ πρὸς τὴν σωματικὴν ὕλην μίξει τῆς κατὰ τοὺς ἀριθμοὺς ἀποπίπτειν ἀκριβείας τε καὶ ἀκρότητος, ἐπεὶ ἔν γε τοῖς ὑπὲρ ἡμᾶς τόποις ἀτρεκής τέ ἐστι καὶ ἀδιάφθορος. οὕτως καὶ τὰς εἰς ἴσα τῶν διαστημάτων διαιρέσεις ἀδυνατοῦμεν καὶ τὰς τῶν συστημάτων συμφωνίας ἐλλιπεῖς ἔχομεν τῆς σωματικῆς παχύτητος παρεμποδιζούσης (W.-I. 105.18–25).

Some of the material in section 8 is developed from Aristides Quintilianus's earlier remarks, but additional specific sources are also suggested. Painting as mimetic of primary nature through forms and shades as specified by physiognomy reflects Aristotle's *Physiognomonica* 2 (806a19–806b3); the ratios of palpitations and periodic fevers are treated in Galen's *De differentia pulsuum* 1.8,29; 2.13–14; 3.3; the consonance of society is discussed in Plato's *Leges* 3 (689d) and *Respublica* 3.12 (402c–d);[178] and the order of the military and social structure "in the best republics" (ἐν ταῖς ἀρίσταις πολιτείαις) is described in Pliny's *Naturalis historia* 33.7–8.

Aristides Quintilianus now concludes: "To have organized these things so palpably through numbers and means, but not music, is to suspect nature of being wholly ignorant and unrefined."[179] This makes it clear that all the classes discussed up to this point—all the technical discussions of Book I, all the ethical and paideutic considerations of Book II, and the arithmetic exegeses of the first part of Book III—are encompassed in this final subclass, the natural, which is the subject of the final part of Book III.

Sections 9–27 are intended, as Aristides Quintilianus states, to "work through the particulars of what is discussed in music, making quite plain the similarity of each particular to the universe altogether."[180] Since all other beautiful things exhibit concord with the universe, music too must have such a relationship. Yet music is distinct from the other arts and sciences and is higher in value because it alone "offers a counterpart of the harmonia of the universe."[181] This statement once again recalls the proem where Aristides Quintilianus proposes the unique value of music and observes that music is able to supply the ratios of the soul—the soul of each person separately and even the soul (or, the harmonia) of the universe.[182]

---

[177] See Mathiesen, *AQ on Music*, 172–74.

[178] These same two passages are also quoted in Theon *Expositio* (Hiller 10–11), which may actually be Aristides Quintilianus's source.

[179] τὸ δὴ ταῦτα μὲν οὕτως ἐναργῶς δι' ἀριθμῶν καὶ μεσοτήτων συνεστάναι, μουσικὴν δὲ μὴ ἂν ὑπονοεῖν παντελῶς ἀμαθοῦς καὶ ἀμούσου τὴν φύσιν ἐστίν (W.-I. 107.9–12).

[180] τὰ καθ' ἕκαστα τῶν ἐν μουσικῇ λεγομένων διεξίωμεν ἑκάστου τὴν πρὸς τὸ σύμπαν ὁμοιότητα διασαφοῦντες (W.-I. 107.13–15).

The proem is also recalled in section 9 by the renewed invocation of Apollo. Here, Aristides Quintilianus makes plain that the material he is about to treat is of special moment, dealing with a subject—the harmonia of the universe—shrouded in mystery and secrecy.[183] This second invocation is thus of structural importance in the design of the treatise because it stresses the identity of the final part of Book III with the goal of the treatise stated at the beginning of Book I. In this way, it balances the form of the entire discourse. At the very end of Book III, Apollo will be thanked for sustaining the author and guiding his work to its termination, and so the form will be closed and complete.

The first four principal categories of Book I (sections 6–9)—notes, intervals, scales, and genera—and the preliminary discussion of music's motion and matter (section 4) are related in Book III to universal motion (section 10) and matter (section 11). Musical motion reflects the universal because it too is incorporeal;[184] musical matter, which is the motion of sound, is like universal matter because it represents both the continuous and the discontinuous.[185] Notes have been defined as both stationary and movable, and things in the universe, likewise, are stationary by region or function, or are movable in the sense of changing from life to death and good to evil.[186] Intervals in music, which may exhibit different dimensions, also have their universal counterpart. The ethereal body, as a plane figure, exhibits two dimensions, like the parhypate, which may be separated from the hypate by a diesis or a semitone. The lower bodies, by contrast, are solid and exhibit three dimensions, like the lichanos, which may be separated from the parhypate by a diesis, a semitone, or a tone. If the different dimensions of the parhypate and lichanos are taken together, it is clear that a group of intervals may exhibit closeness or openness of position, and this matches the greater or lesser densities of material bodies. Finally, the infinite power of nature is limited by the power of the Demiurge, and so all material existence, all beauty is based on limit and reason.

---

[181] τῆς τοῦ παντὸς ἁρμονίας τὴν εἰκὼ φέρει (W.-I. 107.24).

[182] Cf. p. 555 *supra.*

[183] Cf. Plotinus *Enneades* VI.9.[9], ch. 11.

[184] Musical motion is the motion of sound, and sound, as a condition (defined in Book I, section 4), is not itself corporeal.

[185] Cf. Aristotle *Physica* 3 and *Metaphysica* 7.

[186] Various types of motion are described in Plato *Theaetetus* 181c–d and *Leges* 10 (893b–894d) and Aristotle *Physica* 3.1 (201a10) and *Categoriae* 15a13.

Section 11 follows this same method of analogy for scales and genera. The triadic nature of the universe is reflected in a series of parallels as follows:

1.	1.	Incorporeal	Octave	Divine	
	2.	Medial	Fifth	Mortal	
	3.	Corporeal	Fourth	Inanimate	
2.	1.	One dimension	Line	Enharmonic	Spiritual essence
	2.	Two dimensions	Plane	Color	Nature
	3.	Three dimensions	Solid	Diatonic	Sensible body
3.	1.	Enharmonic	One shade	Creative force	
	2.	Color	Three shades	Nature	
	3.	Diatonic	Two shades	Matter	

Figure 92.

All the material in sections 10 and 11 is complementary to the notions in Plato's *Timaeus*, but specific sources for Aristides Quintilianus's treatment remain elusive. These sections are intended to draw some of the material from Book I together with the metaphysics of this part and thereby show them simply as subsidiary to this higher order and preliminary to its understanding. In view of this purpose and since this could only have been done previously by a treatise similarly constructed (which Aristides Quintilianus has asserted does not exist), it is quite likely that the specific relationships have been set out by Aristides Quintilianus himself.[187]

Sections 12 and 13 concentrate on parallels of number, music, and the universe. Aristides Quintilianus begins by anticipating an objection to the last of his groups in the previous section (group 3 in figure 92). The diatonic genus is associated with the number 2 (two shades) in the third group and the number 3 (three dimensions) in the second group, but this is not a contradiction, he asserts, because in matters of magnitude (the second group) the ethereal is plane while the material is solid, and in matters of power (the third group) the ethereal is perfect 3 while the material is imperfect 2. The reason for this interchange is the marriage of the ethereal and the material, which yields the number 6, "the first number completed by its own parts."[188]

---

[187] See Mathiesen, *AQ on Music*, 175–79.

All the numbers in music exhibit these sorts of relationships, Aristides Quintilianus observes, and having already demonstrated the parallels of the octave, fifth, and fourth in section 11, he now proceeds to show complements for the tone, semitones, and dieses. In the ratio of the tone, 9 and 8 represent respectively the number of the starless sphere and the number of the sphere of the zodiac. Multiplying them by 2 to produce ratios of semitones, 18:17:16, yields the plane numbers 18 and 16, which have areas equal to their perimeters and show "the symmetry of what surrounds and is surrounded—the body and the soul."[189] 17, the natural mean to both, represents the natural exchange and emanation of the moon towards the earth. Multiplying the terms again to produce ratios of dieses, 36:[35]:34:[33]:32, yields the number 36, which is the first number at once square and triangular and which represents "the first fashioning of the human animal,"[190] or, the base for the number of days in which a child may be born. This contention is not demonstrated at this point but anticipates sections 18 and 23, where various multiples of numbers produce 210 (the cube on the square of 6, minus the marriage number, 6), which is the number of days in which a seven-month child is fully formed.[191] Even the number of notes in a tonos, set out in various ways, is equivalent to the 28 lunar days and the 29 days in the month.[192] Sections 12 and 13 draw arithmetic demonstrations and enumerations from Book I, section 10, and from Book III, section 1, into the higher natural class and thus parallel sections 10 and 11, which concentrated on sections 6–9 of Book I.[193]

---

[188] πρῶτον τοῖς αὐτοῦ μέρεσι συμπληρούμενον (W.-I. 112.5–6). That is, 1 + 2 + 3 = 6 (cf. Theon *Expositio* [Hiller 45]).

[189] τὴν συμμετρίαν περιέχοντός τε καὶ περιεχομένου, ψυχῆς καὶ σώματος (W.-I. 112.21–22). 16, as a square, has an area of 16, equal to the sum of its four sides; 18, as a rectangle with sides of 3 and 6, has an area of 18, equal to the sum of its four sides.

[190] ἀνθρωπίνου ζῴου τὴν πρώτην δείκνυσι δημιουργίαν (W.-I. 112.26–27). 36 is a square with sides of 6 and a triangle with sides of 8. On the types of numbers, see Theon *Expositio* (Hiller 26–46).

[191] 6 × 6 × 6 – 6 = 210; 7 × 30 = 210. A fuller treatment of 36 and its relationship to 216 and 210 appears in Plutarch *De animae procreatione in Timaeo* 1018a–d and 1027f–1017d, which together with Aristotle *Historia animalium* 7.3 is probably Aristides Quintilianus's source.

The association of five fourths, three fifths, and two octaves in the Perfect Immutable System with the senses, elements, and virtues occupies sections 14–16. These complete the preliminary relation of the technical with the natural class of music and introduce a similar relationship of material from Book II; the entire complex might be diagrammed as in figure 93.[194] The three fifths are first identified in Book I, section 8, as the meson, synemmenon, and diezeugmenon; the two octaves as synemmenon and diezeugmenon. When the terms "synemmenon" and "diezeugmenon" reappear at this point in the treatise, their purpose is not particularly intended to signify specific musical segments of the Perfect Immutable System but rather to distinguish between those elements that are linked (synemmenon) and those that are disjunct (diezeugmenon). As Aristides Quintilianus states:

> Since there are two species of the octave, the first, among mankind, shows four of the faculties of sense together, the actuality of which comes from external conditions and from our own powers alone; the second shows sight as greater, which does not bring about action with two things joined together, but rather is in need of a third, light, for aid. And in the universe, the first

---

[192] There are twenty-eight notes altogether when the Greater and Lesser Perfect Systems are combined and each of the movable notes is separately named by genus (see the chart on p. 374). Further parallels with the number 28 appear in Nicomachus *Manuale harmonicum* 4–5 and 7 (see pp. 407–11 *supra*). Singing the Greater Perfect System in ascent and descent, in a single genus and without repeating the topmost note, results in twenty-nine notes, fifteen up and fourteen down.

[193] See Mathiesen, *AQ on Music*, 179–81.

[194] All of this material is clearly based on a combination of the earlier parts of the treatise (especially Book I, section 8, and Book II, sections 6–9) with the *Timaeus* and *Leges* 1 (631c–d) and 12 (963a–964b). With the exception of discretion (σωφροσύνη) and judgment (φρόνησις), Aristides Quintilianus has hardly mentioned the virtues or elements up to this point in the treatise, but they will now become much more important in his treatment. On the four primary virtues, see Plato *Euthdemus* 279–281, *Respublica* 4.6–8, and the passage from *Leges* cited above.

scale will show the material and what is moved in a straight line and the other will show the ethereal and the region of orbital movement.[195]

Fourths

Hypaton	Touch	Earth	Discretion	Abstinence from illegal pleasure
Meson	Taste	Water		Reasonable use of legal pleasure
Synemmenon	Smell	Air	Righteousness	
Diezeugmenon	Hearing	Fire	Manly spirit	
Hyperbolaion	Sight	Ether	Judgment	

Fifths

Hypaton/Meson (A–e)	Touch/taste	Earth/water	Righteousness/discretion (epithymetic part of the soul)
Synemmenon (f–c')	Smell	Air	Manly spirit (thymic part of the soul)
Diezeugmenon (d'–a')	Hearing/sight	Fire/ether	Judgment (rational part of the soul)

Octaves

Synemmenon (A–a)	Touch/taste/ smell/hearing	Earth/water air/fire	Irrational part of the soul
Diezeugmenon (a–a')	Sight	Ether	Rational part of the soul

Figure 93.

With these associations, Aristides Quintilianus is able to show in section 17 how music presents a paradigm for "every age and the whole of life" (πᾶσα μὲν ἡλικία καὶ σύμπας βίος). As was demonstrated in Book II, music can lead towards virtue or vice, and this is like the relationships of the meson, synemmenon, and diezeugmenon tetrachords. The first tetrachord always has the same beginning and reflects youth, "in the course of which we all live similarly and yield equally to the passions."[196] The mese is a turning point, manifesting the two paths one may take after childhood: virtue or vice. The synemmenon, being shorter, manifests the easy and sweet nature of evil. Just as a scale slips easily and imperceptibly into the synemmenon, so the path of vice is easy to follow. By contrast, the diezeugmenon, with its whole-tone shift, shows the intense transference into the power of virtue. The path of virtue is more difficult but is perfect, just as the octave formed by the meson and diezeugmenon is perfect, while the seventh formed by the meson and synemmenon is imperfect.

---

[195] δυεῖν δὲ εἰδοῖν ὄντοιν τοῦ διὰ πασῶν τὸ μὲν πρότερον ἐν μὲν ἀνθρώπῳ τέτταρα δηλοῖ τῶν αἰσθητηρίων ἅμα, οἷς ἀπό τε τῶν ἐκτὸς πραγμάτων καὶ ἀπὸ τῶν ἡμετέρων δυνάμεων μόνον ἡ ἐνέργεια, τὸ δὲ δεύτερον ὅρασιν ὡς μείζονα, ἥτις οὐ δυεῖν συνεληλυθότοιν ἀποτελεῖ τοὖργον ἀλλὰ καὶ τρίτου προσδεῖται τοῦ φωτὸς εἰς ἐπικουρίαν· ἐν δὲ τῷ παντὶ τὸ μὲν πρότερον σύστημα τὸν ὑλικὸν καὶ ἐπ' εὐθείας κινούμενον, θάτερον δὲ τὸν αἰθέριον καὶ κυκλοφορητικὸν δηλώσει τόπον (W.-I. 115.8–16). See Mathiesen, *AQ on Music,* 181–84.

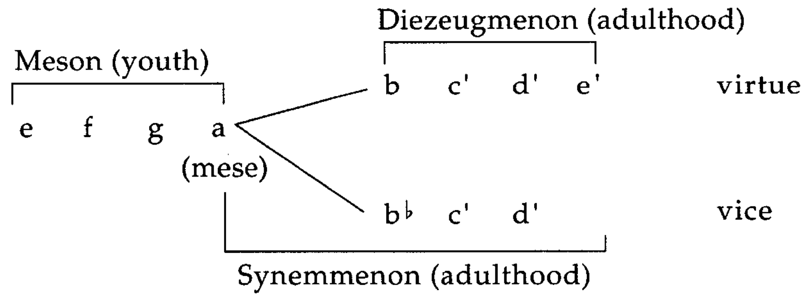


Figure 94.

The section concludes with an allegorical passage from Hesiod's *Opera et dies* (287–292) suggesting the associations Aristides Quintilianus has drawn.

> Look, badness is easy to have, you can take it by handfuls without effort. the road that way is smooth and starts here beside you. But between us and virtue the immortals have put what will make us sweat. The road to virtue is long and goes steep up hill, hard climbing at first, but the last of it, when you get to the summit (if you get there) is easy going after the hard part.[197]

---

[196] καθ' ἣν ἅπαντες βιοῦμέν τε ὁμοίως καὶ παθῶν ἐπίσης ἡττώμεθα (W.-I. 116.17–18).

[197] τὴν μὲν γὰρ κακότητα καὶ ἰλαδὸν ἔστιν ἑλέσθαι ῥηϊδίως· λείη μὲν ὁδός, μάλα δ' ἐγγύθι ναίει· τῆς δ' ἀρετῆς ἱδρῶτα θεοὶ προπάροιθεν ἔθηκαν ἀθάνατοι· μακρὸς δὲ καὶ ὄρθιος οἶμος ἐς αὐτὴν καὶ τρηχὺς τὸ πρῶτον· ἐπὴν δ' εἰς ἄκρον ἵκηαι, ῥηϊδίη δὴ ἔπειτα πέλει χαλεπή περ ἐοῦσα (W.-I. 117.12–17). Translation by Richmond Lattimore (*Hesiod: The Works and Days, Theogeny, Shield of Herakles* [Ann Arbor, MI: University of Michigan Press, 1959]).

The passage was well known and widely quoted in antiquity; Aristides Quintilianus may have known it not from Hesiod but from Plato's *Leges* 4 (718e–719a), where it appears more or less in full, or from *Respublica* 2.7 (364c–d), where it is abbreviated.

The Hesiod quotation acts as an intermediate conclusion to the material of sections 9–17. It is clear at this point that Aristides Quintilianus has been concentrating on the relationships of music and number with the lower level of terrestrial existence and all its universal attributes. In the next segment, sections 18–23, he will draw out the creation of terrestrial existence and its relationship to the body of the universe (the planets, primary elements, and so on) through further musical and numerical demonstrations.

The consideration of the body of the universe begins with the creation of animals in section 18. This creation is illustrated in the perfect (or, "marriage") number, 6,[198] which provides a base for the harmonic proportion 6:8:9:12. The sum of these numbers is 35, the number of days it was thought to take for the fetus of seven-month children to form distinct parts.[199] 35 multiplied by 6 produces 210, the "number equal to the daily cycles of seven-month children"[200] (i.e., 7 × 30 days = 210). If the numbers in the rhythmic ratios 1:2:3:4 are added, the number 10 results. Adding this to 35 yields 45, the preliminary gestation period for nine-month children. Likewise, 45 multiplied by 6 produces 270, the number of days in which nine-month children are born alive (i.e., 9 × 30 days = 270). Eight-month children cannot be born alive because the necessary base number, 40, cannot be produced except by omitting some of the numbers of the harmonic and rhythmic ratios. These same ratios also exhibit bodily beauty in symmetry and therefore show that music is an illustration of the abstract nature of beauty; it is not simply beauty itself.

Aristides Quintilianus may have developed this section from traditional Pythagorean lore (which associated 6, 8, 9, and 12, respectively, with the four humors: lacteus, sanguineus, caro, and corpus), drawing on the work of Censorinus, Varro, and others. But in view of his apparent widespread use of Plutarch's *De animae procreatione in Timaeo*, it seems more likely that he may once again have turned to this treatise (1017e–1018d) as well as Aristotle's *Historia animalium* 7.3–4 (for the material on the viability of the fetus) and Plato's *Respublica* 3.12.[201]

---

[198] See p. 559 *supra*.

[199] Cf. p. 426 *supra*.

[200] ἰσάριθμον ταῖς τῶν ἑπταμήνων περιόδοις ἡμερησίαις (W.-I. 118.1–2).

In section 19, Aristides Quintilianus expands the interrelationships to include the primary elements and seasons, no doubt drawing on the *Timaeus* (55d–56b, especially for the associations of elements, forms, and numbers) and Plutarch's *De animae procreatione in Timaeo* (1028f, for the relationship with the seasons). The arrangement can be set out as follows:

Fire	Pyramid	4	Summer
Earth	Cube	6	Autumn
Air	Octahedron	8	Spring
Water	Icosahedron	12	Winter

Figure 95.

Two of the elements, fire and water, are angle forms associated with "creative bodies," while the other two, earth and air, are plane forms associated with "affective bodies." These associations, derived from the *Timaeus* (56c–57c), pertain to the transformations of the primary elements.

From the demonstration of the complements among the primary elements, the creation of animals, the seasons, number, and music, Aristides Quintilianus concludes (section 20) that "there is ... in the body of the universe a palpable paradigm of music,"[202] and in the next five sections, this conclusion is further supported by material apparently drawn from Ptolemy's *Tetrabiblos* 1.6–7, 12–13, 18, 23;[203] Theon's *Expositio* (Hiller 118–19); and, of course, Plato's *Timaeus* and Plutarch's *De animae procreatione in Timaeo*.

Section 20, as an introduction to sections 21–24, points out that though the movements of the universe must produce sound according to the laws of physics, universal sounds are imperceptible to most because their ears are not adapted to hear the sounds. This explanation is distinct from the traditional one preserved by Aristotle's *De caelo* 2.9, reflecting Aristides Quintilianus's different point of view: the sounds can be heard by special persons of sufficient virtue and knowledge.[204]

---

[201] See Mathiesen, *AQ on Music,* 185–86.

[202] ῎Εστιν οὖν κἀν τῷ τοῦ παντὸς σώματι παράδειγμα μουσικῆς ἐναργές (W.-I. 119.21–22).

[203] Or perhaps from Porphyrius's introduction to the *Tetrabiblos.*

Since the planetary movements do emit sounds, some of the planets are more masculine, some more feminine, and some medial in accord with the distinctions set out in Book II, sections 12–14. The order is given in section 21, where specific characteristics are also assigned to masculine, feminine, and medial natures.

Moon	Wet	Epsilon	Feminine (slightly masculine)	Night	Proslambanomenos
Hermes	Dry	Alpha	Masculine (slightly feminine)	Day	Hypate hypaton
Aphrodite	Wet	Eta	Feminine	Night	Parhypate hypaton
Sun	Dry	Omega	Masculine	Day	Lichanos hypaton
Ares	Dry/wet	Alpha	Masculine (somewhat feminine)	Night	Hypate meson
Zeus	Temperate	Eta	Feminine	Night	Parhypate meson
Kronos	Dry	Omega	Masculine	Day	Lichanos meson

Figure 96.

The four triangles of the zodiac[205] are then associated with the four tones of the synemmenon as follows:

---

[204] Aristotle, while rejecting it, refers to the common argument that the sound is not heard consciously because it is constant from birth. For a useful survey of the subject, see Levin, "Nicomachus. Manual of Harmonics," 80–103; and Mathiesen, *AQ on Music*, 188–90.

[205] The four triangles are:

	Signs	*Governors*
I.	N.W.: Aries, Leo, and Sagittarius	Sun (day) and Zeus (night)
II.	S.E.: Taurus, Virgo, and Capricorn	Aphrodite (day) and Moon (night)
III.	N.E.: Gemini, Libra, and Aquarius	Kronos (day) and Hermes (night)
IV.	S.W.: Cancer, Scorpio, and Pisces	Ares, Aphrodite (day), and Moon (night)

See Ptolemy *Tetrabiblos* 1.18.

First triangle	Three signs[206]	Masculine	Alpha	Mese
Second triangle	Three signs	Feminine	Eta	Trite synemmenon
Third triangle	Three signs	Masculine	Omega	Paranete synemmenon
Fourth triangle	Three signs	Masculine /feminine	Alpha	Nete synemmenon

Figure 97.

And the seven remaining notes—those of the diezeugmenon and hyperbolaion tetrachords—are assigned to the planets, but with qualities now opposite,[207] reflecting the fact that, as Aristides Quintilianus observes, "they function in one way throughout the night and in another way throughout the day."[208]

Moon	Alpha	Masculine	Paramese
Hermes	Eta	Feminine	Trite diezeugmenon
Aphrodite	Omega	Masculine	Paranete diezeugmenon
Sun	Alpha	Masculine	Nete diezeugmenon
Ares	Eta	Feminine	Trite hyperbolaion
Zeus	Omega	Masculine	Paranete hyperbolaion
Kronos	Alpha	Masculine	Nete hyperbolaion

Figure 98.

The arrangement described by Aristides Quintilianus is quite different from that preserved in Nicomachus's *Manuale harmonices* 3, Ptolemy's *Harmonica* 3.8–16, or Theon's *Expositio* (Hiller 138–43).[209] It is impossible to determine the exact source for this section, although the characteristics assigned to the planets and the details of the zodiacal arrangement do follow Ptolemy's *Tetrabiblos* 1.4–23.

In several of the sections of Book III, Aristides Quintilianus appears to be developing his own relationships and demonstrations to pull together the various materials already introduced and to focus them on his epistemological goal. In section 22, the fifteen notes of the Greater Perfect System are associated with the fifteen tonoi of Book I, section 10, and the zodiac itself, as introduced in Book III, section 21.

---

[206] The signs are Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricorn, Aquarius, and Pisces. Cf. pp. 491–93 (and n. 241) *supra.*

[207] The Sun and Kronos, though still masculine, are now reflected by the medial alpha instead of the strictly masculine omega. Mathiesen, *AQ on Music,* 190–92.

[208] ἑτέρως γὰρ διὰ νυκτός, ἄλλως δὲ δι' ἡμέρας δύναται (W.-I. 122.25–26). See Ptolemy *Tetrabiblos* 1.7.

[209] See pp. 396–97, 409, 428–29, and 484–94 *supra.*

Moon	Hypodorian	Daytime actualities
Hermes	Hypoiastian	
Aphrodite	Hypophrygian	
Sun	Hypoaeolian	
Ares	Hypolydian	
Zeus	Dorian	
Kronos	Iastian	
Zodiac	Phrygian	
Moon	Hyperlydian	Nighttime actualities
Hermes	Hyperaeolian	
Aphrodite	Hyperphrygian	
Sun	Hyperiastian	
Ares	Hyperdorian	
Zeus	Lydian	
Kronos	Aeolian	

Figure 99.

The Hypodorian is initially associated with the moon as the lowest of the planets, and the subsequent tonoi, notes, and planets move up sequentially. Inasmuch as the two sequences of planets result in only fourteen parallels, the zodiac itself is introduced in the middle of this section to provide the fifteenth. In this case, it parallels the mese—the position it also occupied in the previous section—and the Phrygian tonos. The arrangement described by Aristides Quintilianus associates contrasting tonoi with each planet. For example, the moon in its daytime actuality parallels the Hypodorian while in its nighttime actuality it parallels the Hyperlydian. Likewise, Zeus is Dorian in the day and Lydian at night. Finally, since certain rhythms and instruments have already been related to the modes in Book II, these associations are extended to the planetary powers, which clarifies their ability to affect mankind through universal mimesis.[210]

Section 23 continues the association of the zodiac with musical numbers and the creation of life, building upon sections 12 and 18. The zodiac is partitioned into twelve parts, the signs from Aries to

---

[210] Mathiesen, *AQ on Music*, 192–93.

Pisces,[211] which parallel the twelve whole-tones in the Greater Perfect System (Book I, section 10). This number is also embodied in the first right-angle triangle that can be constructed with entirely rational sides: 3 + 4 + 5 = 12, and the triangle in turn suggests the existence of seven-month (4 + 3) and nine-month (4 + 5) children, composed of feminine and masculine numbers, while further proving the "unviable and lifeless birth of eight-month children"[212] because they are the sum of the masculine numbers, 3 and 5.

The triangle may also be subjected to further sorts of mathematical manipulation, resulting in meaningful numbers, for example: $3^3 + 4^3 + 5^3 = 216$ (210, the number of seven-month children, plus 6, the marriage number); $(3 \times 4 \times 5) + 216 = 276$ (270, the number of nine-month children, plus 6); 3 = 2 + 1, or 2:1; 4 = 2 + 2, or 1:1; 5 = 3 + 2, or 3:2; and two of the sides exhibit the ratio 4:3. Moreover, the sum of the sides, 12, multiplied by 3, the first perfect number, produces 36, the number of ascendants.[213] Multiplying 36 by 10 produces the number of degrees in the zodiac,[214] and the circle of the zodiac embraces the proportional angles and figures illustrated in figure 100.

Angles AB, AD, BC, and CD are four right angles; angles AE, EF, FB, BG, GH, HC, CI, IJ, JD, DK, KL, and LA are twelve acute angles; one hexagon, BELDIH, embraces six acute angles; one square, ABCD, embraces three acute angles per side; one triangle, AGJ, embraces four acute angles per side; and one discordant line, AH, may be drawn. The hexagon shows equal ratios to itself and the sesquialteran to the square. The triangle shows the sesquitertian ratio to the square and the duple to the hexagon. Five angles show no consonant ratio (line AH), and six angles, the diameter, are consonant with every figure (6:4, 6:3, 6:2, or 3:2, 2:1, 3:1). From this figure, Aristides Quintilianus concludes that harmonic ratios are those where the larger number shows the smaller through consonance, though it cannot be divided by the smaller, that is, 6:4, 8:6, and 9:6; while the rhythmic ratios are those where a single number is partitioned in the arsis and the thesis, that is, 5 or 7 (3 + 2 or 4 + 3).[215] This same treatment of rhythmic ratio appears in Book I, sections 14 and 18.

---

[211] Ptolemy *Tetrabiblos* 1.9.

[212] ἄτροφον γονὴν καὶ ἄζων τὴν τῶν ὀκταμήνων (W.-I. 124.12).

[213] Celestial space is arranged in twelve parts called "houses," each of which includes thirty degrees of the zodiac and corresponds to a phase of human life. The first house, the ascendant, contains the stars and planets rising over the eastern horizon; the powers and characteristics of the planets were modified by their combination with various signs of the zodiac and the houses in which they appeared. See de Givry, *Witchcraft, Magic, and Alchemy*, 220–39.

[214] Cf. Ptolemy *Tetrabiblos* 1.13 and *Harmonica* 3.9 (see pp. 484–87 *supra*).

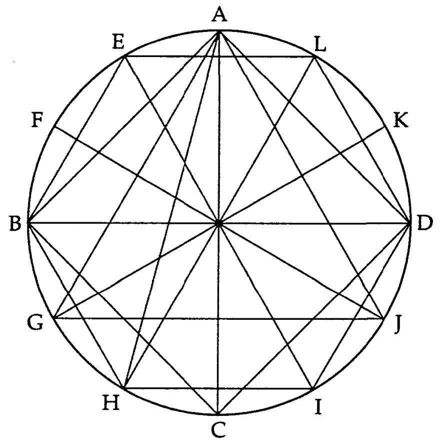


Figure 100.

Sections 24 and 25 concentrate on the highest of the musical relationships: the relationship of music and the soul of the universe.[216] Aristides Quintilianus makes clear the distinction between this segment and the material discussed up to this point when he declares: "that not only the **body** of the universe but also the **soul** was organized and is considered through consonant numbers, the ancient and wise men affirmed confidently."[217] Section 24 is based on a very close paraphrase of Plato's *Timaeus* 35a–c, but the psychogony also appears in Plutarch's *De animae procre-*

---

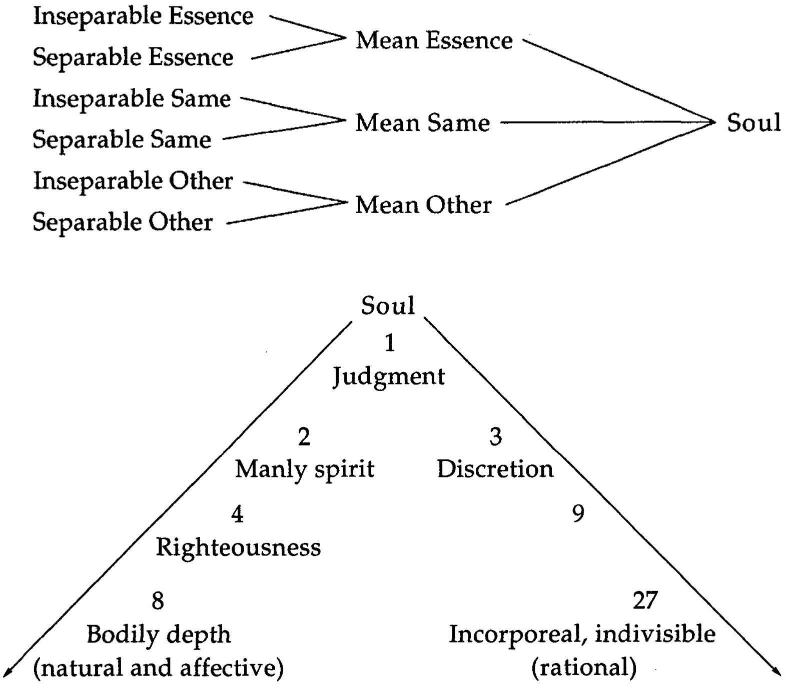
[215] Mathiesen, *AQ on Music*, 193–95.

[216] Sections 9–17 concentrated on the lowest of the relationships, music and terrestrial existence, while sections 18–23 focused on the intermediate relationship of music and the body of the universe.

[217] Καὶ μὴν οὐ τὸ σῶμα τοῦ παντὸς μόνον ἀλλὰ καὶ τὴν ψυχὴν δι' ἀριθμῶν συμφώνων συνεστάναι καὶ θεωρεῖσθαι παλαιοί τε ἄνδρες καὶ σοφοὶ διισχυρίσαντο (W.-I. 125.29–31). It should be noted that this highest relationship is not analogous to Boethius's *musica mundana* (*De institutione musica* 1.2), which would clearly be included in Aristides Quintilianus's intermediate hypostasis, while *musica humana* and *musica instrumentalis* would fall within the lowest hypostasis. Aristides Quintilianus's three hypostases are similar to those of Plotinus (*Enneades* IV.8.[6], ch. 6; V.4.[7], ch. 1; VI.9.[9], ch. 1ff; V.1.[10], ch. 10; and V.2.[11]).

atione in Timaeo. In view of his other apparent uses of this work, it is quite possible that Aristides Quintilianus's explication of this passage is derived, at least in part, from Plutarch.[218]

The arrangement of the soul of the universe (as described by Aristides Quintilianus) may first be set out in a series of diagrams.[219]


Inseparable Essence
Separable Essence
Mean Essence
Inseparable Same
Separable Same
Mean Same
Inseparable Other
Separable Other
Mean Other
Soul
Soul
1
Judgment
2
Manly spirit
3
Discretion
4
Righteousness
9
8
Bodily depth
(natural and affective)
27
Incorporeal, indivisible
(rational)

Proportions

Arithmetic = homoeomery of the soul
Geometric = bodily depth
Harmonic = soul and body together

Figure 101.

The suspension of the numbers is also represented by Aristides Quintilianus in the form of a straight line and a curve.

---

[218] For a thorough study of the Platonic psychogony, see F. M. Cornford, *Plato's Cosmology; The* Timaeus *of Plato Translated with Running Commentary* (London: Routledge and Kegan Paul, 1937), especially pp. 60–97. The Platonic "Myth of Er" (*Respublica* 10) is also recalled here.

[219] On the soul, see Proclus 2.155 and Cornford, *Plato's Cosmology,* 61; the proportions are derived from *Timaeus* 35c–36a.

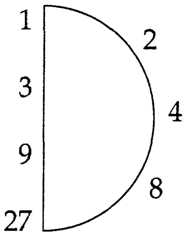


Figure 102.

In this figure, 9 precedes 8 because it is but a square of 3 and therefore a lower power than 8, which is a cube of 2. The curve of even numbers is better for bodies because it is lighter and purer; but for souls, the curve is fickle and affective (because bodily). In contrast, the straight line of the odd numbers is inferior for bodies because it is lower (27 being a lower number than 8 in position on the diagram) and therefore more material; but for souls, the straight is better because it is expressive of equality and identity, of concavity and convexity together.

In the last part of section 24, Aristides Quintilianus turns to an explanation of the two circles of *Timaeus* 36b–37b. Here, he states that Plato contrives the consonance of the parts of the soul through the sesquitertian ratio, which, he says, signifies animation by length, breadth, and depth. This ratio is represented by the seven circles cut from the circle of the Other, four of which rotate in ratio to the other three.[220] Aristides Quintilianus associates these two circles (i.e., the one made up of the even numbers and the other made up of the odd) with the zodiacal appearances:[221] the even circle with the practical part of the universe, the odd with the theoretical. In this way the whole order of the universe provides a paradigm for the two divisions of music introduced in Book I: the theoretical and the practical. This association—the first with the full divisions rather than with classes or subclasses—marks the rounding out and completion of the treatise.[222]

With this delineation of the soul of the universe, Aristides Quintilianus is now able to focus attention in section 25 on the only subjects introduced earlier in the treatise that have still not been specifically related to the order of the universe: divine suffusion and melic and rhythmic composition. Divine suffusion[223] has earlier been associated with the rational, higher part of the universe, the soul of the universe. Likewise, melic composition, rhythmic composition, and poesy are complexes of their parts, united in one whole, and so parallel the whole universe, which is a complex of its own parts in one unitary proportion.[224]

---

[220] See Cornford, *Plato's Cosmology*, 74–93; cf. Ptolemy's treatment of similar material in his *Harmonica* (pp. 487–94 *supra*).

[221] See Ptolemy *Tetrabiblos* 1.12–14 and Plutarch *De animae procreatione in Timaeo* 1028a–1030c.

[222] Mathiesen, *AQ on Music*, 195–99.

Aristides Quintilianus observes that the soul is inclined towards terrestrial life through a loss of judgment, that is, through a departure from the One, which was associated with judgment (φρόνησις)—the highest of the four virtues[225]—in the previous section. Because of its ignorance and forgetfulness, it must be restrained by melody, which restores ratio and proportion through mimesis. Music is therefore a suffusion of the divine. This notion is conveyed in section 25 by references to the soul's descent, the effect of music on character, and the authority of Homeric quotations—all of which are clearly based on Book II and relate the material of Book II to Book III. In addition, the references to judgment throughout Book III relate it to Book II (section 2) and Book I (section 1), clearly revealing the way in which the author patterns his use of terms and gradually unfolds the full force of his argument. For instance, the association of judgment with the soul of the universe, the One, is not fully revealed until Book III. Once this association is revealed, the earlier references become clearer and take on enlarged meaning, just as the third book as a whole enlarges and elevates the material of the first and second books.

Melic and rhythmic composition illustrate the cosmos of matter and the cosmos of the soul. This is easily demonstrated on the basis of the preceding sections of Books II and III where four of the vowels have been associated with musical notes, genders, and primary elements; and where the proportions of the arses and theses have been illustrated.

---

[223] See pp. 544–45 *supra.*

[224] A reflection of the first hypostasis of Plotinus (*Enneades* VI.9.[9], chs. 4 and 7; V.4.[7], ch. 1; V.2.[11], ch. 1; and Porphyrius *Sententiae*).

[225] The others are manly spirit (ἀνδρία), discretion (σωφροσύνη), and righteousness (δικαιοσύνη).

ε	Earth	Feminine	Creation
α	Water	Masculine/feminine	
η	Air	Feminine	
ω	Fire	Masculine	

Figure 103.

To these is added tau, because—as Aristides Quintilianus now reveals—"its form is akin to the plectrum and it is sacred to god, who, a phrase of the wiser men declares, is the plectrum of the universe." Tau is associated with ether, which "accords living power to the other elements"[226] just as the consonant allows the vowels to be clearly voiced and distinct. Consequently, music reflects the cosmos of the soul through the movement of the notes while the cosmos of matter exists in the ordering of the elements.

Rhythm, too, is related to the cosmos: the thesis signifies the creation of individual beings and the arsis, their death. Aristides Quintilianus asserts that just as there is no rhythm unless both arsis and thesis are present, so also creation leads to death and death is the starting point of creation.

Aristides Quintilianus also observes in section 25 that there are two types of melody and two types of rhythm: one type of melody moves in a straight line, one note after another in sequence, another moves by "modulation of the order of the letters";[227] one type of rhythm is constant, another modulates. If melic and rhythmic composition are mimetic of the cosmos, there must also then be two types of cosmic movement, that is, two types of future; this implicit proposition leads to the last two sections of the treatise.[228]

At the beginning of section 26, Aristides Quintilianus supports the contention that there are two types of future by analogies with life cycles and political cycles and, of course, by references to Homer. These demonstrate two types of future: the "what-will-be" (γενησόμενον) and the "what-may-be" (μέλλον). The what-will-be, seated in the region above the Moon, is necessary, divine, and unalterable; the what-may-be, seated here, is uncertain and possible. Things that are "contingent in general" (τὰ καθόλου συμβαίνοντα) are necessary; things that are "contingent in part" (τὰ ἐπὶ μέρους συμβαίνοντα) are alterable.[229] The material of this section quite clearly reflects the notions of Plotinus's *Enneades* II.3.[52], ch. 9, and III.1.[3], ch. 1; and Plato's *Leges* 4 (709a–c) and 11 (923a).

---

[226] πλήκτρῳ τε γάρ ἐστι τὸ σχῆμα παραπλήσιον, ἱερόν τέ ἐστι θεοῦ ὃν τοῦ παντὸς εἶναι πλῆκτρον ὁ τῶν σοφωτέρων ἀποφαίνεται λόγος (W.-I. 130.10–13); τοῖς λοιποῖς ζωτικὴν δύναμιν μεταδιδούς (W.-I. 130.14–15). See pp. 549–50 *supra*.

[227] ἡ δὲ κατὰ μεταβολὴν γίνεται τῆς τῶν στοιχείων ⟨τάξεως·⟩ (W.-I. 130.3).

[228] Mathiesen, *AQ on Music*, 199–202.

The two futures are represented in music. Melody that moves in a straight line consists of notes that are contingent in general; it is therefore a paradigm of the what-will-be. Melody in which the notes move disjunctly and not always in sequential order shows the what-may-be. This emphasis on contingency, combined with the analogy of melody, recalls the earlier definition of melos (Book I, section 4), gives it an enlarged meaning, and stresses once again the way in which all the earlier technical constructions are simply paradigmatic for the metaphysical discussion of Book III; they were not in fact intended at all for simple demonstration of the technical rules of music. So, when Aristides Quintilianus defined music in Book I, section 4 as "a science of melos and of those things contingent to melos,"[230] he was not simply speaking of a group of mutually interdependent parts but rather of a chain of necessary relationships predicated on one another, a larger sense stressed in his association of this definition with his own definition: "But we define it more fully and in accordance with our thesis: 'knowledge of the seemly in bodies and motions.'"[231]

Since music is a paradigm of the futures, modulation in music may also reflect modulation (or, change) of the what-may-be. The final section explains the means by which this is to be accomplished. Here again, the association of this enlarged sense of modulation with the earlier treatments (Book I, sections 11 and 19; Book II, section 14) stresses the relationship of the three books and the method of Aristides Quintilianus's discourse.[232]

---

[229] All this is further developed by Aristides Quintilianus in his interpretation of Herodotus's oracle (*Historiae* 9.43). See Mathiesen, *AQ on Music*, 203–4. The reference to Lachesis, aside from its relationship to the oracle, calls to mind the "Myth of Er" in Plato *Respublica* 10 (especially 14–16).

[230] ἐπιστήμη μέλους καὶ τῶν περὶ μέλος συμβαινόντων (W.-I. 4.18–19).

[231] ἡμεῖς δὲ τελεώτερον ἀκολούθως τε τῇ προθέσει· γνῶσις τοῦ πρέποντος ἐν σώμασι καὶ κινήσεσιν (W.-I. 4.22–23, without his emendations). See p. 526 *supra*.

[232] Mathiesen, *AQ on Music*, 202–4.

And now, the epistemological goal of the treatise is reached. There is an escape from the "inconvenient concatenation of nature" (ὁ ἀσύμφορος τῆς φύσεως εἱρμός) through the "divine transference of philosophy," which releases "the soul from its passionate clinging to bodies" and produces, with the aid of virtue, "a man worthy of the valuable things, scientifically versed in the foreknowledge issuing from the divine and the similar."[233] This, of course, refers to the soul's function of contemplating the divine forms and the One, the foreknowledge of which, as Aristides Quintilianus once again points out here, has been forgotten by the soul in its descent into the body. Philosophy, therefore, provides a means for the soul to know and hence to reascend to its original source.[234] This goal recalls the very beginning of the treatise, where Aristides Quintilianus inquired which god should be invoked "because one is subject to the ascent of the soul ..." (τις ἀνόδῳ χρώμενος).

Philosophy perfects every knowledge, and music is its "greatest consort and attendant" (ἡ μεγίστη σύννομος καὶ ὀπαδός). Both music and philosophy must be respected and accorded their proper places, even though both are inferior to the greater Mysteries.[235] Music should be practiced and taught because it transmits the beginnings of every aspect of learning (as was also observed in the proem, Book I, section 1) and is, moreover, an agreeable preliminary to philosophy. With these observations as the culmination of his treatise, Aristides Quintilianus confirms the point clearly unfolding throughout the treatise: music as the palpable paradigm of the body and soul of the universe provides a model for learning the higher philosophical contemplation that leads to divine transference.[236]

---

[233] μόνη δῆτα ἡ θεία διὰ φιλοσοφίας μετάστασις ἀτρεκής τε καὶ βέβαιος ἐς μεταβολήν, τῆς μὲν πρὸς τὰ σώματα προσπαθείας ἀπολύουσα τὴν ψυχήν, τῇ δὲ μεθέξει τῆς ἀρετῆς ἄξιον τὸν τῶν τιμίων ἐπιστήμονα τῆς παρὰ τοῦ θείου καὶ ὁμοίου προνοίας ἀπεργαζομένη (W.-I. 133.11–16).

[234] On the matter of the soul's escape through philosophy, see Smith, *Porphyry's Place in the Neoplatonic Tradition*, 56–80. On the virtues and preparation for contemplation, see Plotinus *Enneades* I.2.[19] and I.3.[20]. On the soul's contemplation of the One, see *Enneades* VI.9.[9].

[235] On the Mysteries, see Plotinus *Enneades* VI.9.[9], Iamblichus *De mysteriis*, and the discussion in Smith, *Porphyry's Place in the Neoplatonic Tradition*, 83–99.

[236] Mathiesen, *AQ on Music*, 204–6.

Aristides Quintilianus now quickly concludes his treatise with a valediction to Apollo, "who urged on my impulse to this point and led my attempt to the end";[237] in this way, the overall structure of the treatise is closed and balanced. If anything has been omitted, it is "not so bad" (οὐδ' οὕτω κακῶς),[238] because the treatise can stand as a model for a later treatment that may surpass this one in its attempt—as Aristides Quintilianus proposed at the very beginning—to present the art whole, to show every substance of it in bodies and every semblance in sound and number, and, finally, to reveal the order of the soul of each person and of the universe.

Aristides Quintilianus's treatise occupies a unique position in the corpus of ancient Greek music theory. First, it is the only one of the three known large-scale treatments[239] from antiquity to survive in complete form, apparently as originally conceived and composed by the author. Moreover, it contains an enormous amount of technical detail, a good portion of which seems to accurately represent material drawn from much older sources. While other treatises provide additional or more complete technical detail on one point or another, none develops a fuller treatment of musical ethos and only the last part of Ptolemy's *Harmonica*[240] makes a comparable attempt at a musical metaphysics. Finally, the grand scope of its conception and realization set it apart. No other Greek musical writer responded to Aristides Quintilianus's offer of his treatise as a model to be surpassed, at least not until the fourteenth century when Manuel Bryennius drew heavily upon

---

[237] τῷ τε ἐς τόδε τὴν ὁρμὴν προτρεψαμένῳ καὶ ἐς τέλος ἀγαγόντι τὴν ἐπιχείρησιν (W.-I. 134.7–8).

[238] This phrase is derived, probably, from a story preserved in Plutarch *De tranquilitate animi* 467c–d and also in *Septem sapientium convivium* 147c. It seems likely that the former is the source because this very passage relates to the changing of the direction of fortune and therefore closely parallels the subject of the last two sections of the treatise. The story tells of a young man who threw a stone intending to hit his dog. The stone hit his stepmother instead, whereupon he exclaimed: "Not so bad!" The story may be thought ironic, and perhaps Aristides Quintilianus is injecting a note of humor here. In view of its context in Plutarch, however, it seems more likely that he intends to suggest an association with Plutarch's own treatment.

[239] The others, of course, are the *Harmonica* (including the *De principiis*) of Aristoxenus and the *Harmonica* of Claudius Ptolemy.

[240] If it actually represents Ptolemy's intentions. See pp. 490–93 *supra*.

Aristides Quintilianus—and other early writers—in the construction of his own *Harmonica* in three books. Byzantine scholars such as George Pachymeres and Bryennius realized that in adapting the neo-Pythagorean and neo-Platonic music theory of antiquity, they could develop a speculative music theory for their own time, but their treatises are hardly comparable to the treatise of Aristides Quintilianus.[241]

Among early Latin writers, both Martianus Capella and Boethius employed Greek sources in composing their own extended treatments of music, Boethius drawing on Nicomachus and Ptolemy for his *De institutione musica*, Martianus Capella virtually excerpting Aristides Quintilianus's Book I, sections 5–19, for Book IX of his *De nuptiis Philologiae et Mercurii*. While neither author's work could be seen as a direct development of Aristides Quintilianus's approach, both works did maintain the tradition of the musico-philosophical treatise, albeit in rather different ways, and their influence in the Middle Ages, which varied according to time and place, insured the survival and growth of the broad speculative view of music.

Aristides Quintilianus wrote at the very beginning of his treatise: "The contempt of most people for this subject has above all persuaded me to set to work on this treatise, proposing to demonstrate the kind of learning they improperly hold in disgrace."[242] Substantial portions of his treatise were read throughout the Middle Ages in the work of Martianus Capella and later in the treatise of Manuel Bryennius, but neither writer mentions him by name, nor does he appear in Cassiodorus's list of important authors at the end of the section on music in his *Institutiones*. Lost in the contempt he himself identified, his name and his work as a whole seem to have been largely forgotten until the end of the fifteenth century when Franchino Gaffurio read the treatise in a translation by Francesco Burana and cited Aristides Quintilianus in his *Theorica musice* (1492), *Practica musice* (1496), and *De harmonia musicorum instrumentorum opus* (1518).[243]

---

[241] For a consideration of Pachymeres and Bryennius, see Mathiesen, "Aristides Quintilianus and the *Harmonics* of Manuel Bryennius," and pp. 656–67 *infra*.

[242] Ἐμὲ δὲ ἐπῆρεν ἐπιχειρῆσαι τῷ συγγράμματι μάλιστα μὲν ἡ τῶν πλείστων περὶ τὸ πρᾶγμα ὀλιγωρία, ἐπιδεῖξαι προῃρημένον οἷον μάθημα οὐ προσηκόντως δι' ἀτιμίας ἄγουσι (W.-I. 2.23–26).

[243] Mathiesen, *AQ on Music*, 6. See n. 64 *supra*.

Bacchius

If the *De musica* of Aristides Quintilianus represents the one extreme of philosophical complexity in the corpus of ancient Greek music theory, the small musical catechism preserved under the title of *Introductio artis musicae* by the author known as Bacchius Geron represents the opposite extreme. Here, theory is reduced to a series of simple questions and answers,[244] presenting a mixture of definitions and traditions that cannot be assigned exclusively to any one school. The treatise must have been intended as nothing more than a schoolbook of sorts, perhaps not unlike the scholastic catechisms of the thirteenth century in which the theory is no longer a living tradition or even an object of historical or antiquarian interest but simply a part of the necessary learning expected of the educated man.

Indeed, a somewhat enigmatic epigram found in a number of manuscripts lends support to this point. Bacchius's *Introductio artis musicae* is usually—but not always—followed in the manuscripts by a second distinct treatise that nevertheless carries the same title and identifies Bacchius as its author. Most—though not all—of these manuscripts include in close proximity to the second treatise this epigram:

> Of music, Bacchius Geron described
> the tonoi, tropoi, mele and consonances.
> Echoing him, Dionysius writes.
> The all-powerful Emperor Constantine
> he shows to be a wise lover of the works of art.
> For one who, of every wise subject of instruction,
> has been seen as discoverer and giver,
> it is most unseemly to be a stranger to music.[245]

Beyond its allusion to Bacchius, the epigram is not clearly associated with the first treatise. In fact, when the first treatise appears alone, it is never accompanied by the epigram, and even in its earliest appearance together with the second treatise, the text is separated from the epigram by a large space. When it does appear, the epigram is usually followed by the musical hymns attributed to Mesomedes (second century C.E.). Despite the fact that the epigram might seem more directly connected to the hymns than to either of the treatises, it has commonly been taken to refer to the second treatise, the attribution of which is accordingly modified (even in some of the manuscripts) to Dionysius and dated to the reign of Constantine the Great (306–337 C.E.). The epigram could, however, refer just as well to another emperor of the same name, including the Byzantine Constantine VII Porphyrogenitus (905–959 C.E.), known for his support of classical scholarship.

---

[244] Cf. the excerpt from the treatise of Ptolemaïs (pp. 515–16 *supra*).

[245] Τῆς μουσικῆς ἔλεξε Βακχεῖος γέρων, | τόνους τρόπους μέλη τε καὶ συμφωνίας· | τούτῳ συνῳδὰ Διονύσιος γράφων | τὸν παμμέγιστον δεσπότην Κωνσταντῖνον, | σοφὸν ἐραστὴν δείκνυσι τεχνημάτων· | τὸν τῶν ἁπάντων γὰρ σοφῶν παιδευμάτων· | ἐφευρετήν τε καὶ δότην πεφηνότα | ταύτης προσῆκεν οὐδαμῶς εἶναι ξένον (Mathiesen, *RISM BXI*, **36**; cf. Jan 285. 1–8).

The second treatise is not based on questions and answers. Written in straightforward prose, it remarks on the fallibility of the senses (sight, smell, taste, touch, and hearing) in making consistent quantitative discriminations: musicians must accordingly turn to the canon for precise measurements.[246] Most of this appears verbatim, but without attribution, in Bryennius's *Harmonica* (2.6). The second treatise concludes with eight theorems demonstrating the proportions for the consonant octave, fifth, fourth, twelfth, and fifteenth; the eleventh, which is regarded here as dissonant; the tone; and the impossibility of dividing the tone into two equal parts. The theorems—and especially those on the eleventh and the division of the tone—conflict with the answers provided in the first treatise; indeed, the second treatise is entirely different from the first in approach, style, and content. Whether or not the epigram refers to the second treatise and correctly identifies its author, its attribution to Bacchius in the manuscripts is surely mistaken, most probably the result of an inadvertent connection of the end-title[247] of the first treatise with the beginning of the second.

Though the first and second treatises—and Bacchius and Dionysius—have been taken as contemporaneous, this cannot be demonstrated on any compelling grounds, and the epigram is of no use in dating either treatise. The unassuming character, routine and eclectic content, and style of the first treatise, however, suggest a period no earlier than the fourth century C.E., while the Pythagorean tone of the second treatise could fall almost any-where within the range between the two emperors Constantine.[248] Like most of the other authors of the smaller treatises, Bacchius and Dionysius remain shadowy figures.

---

[246] Here again, cf. the excerpt from the treatise of Ptolemaïs.

[247] In Greek manuscripts, it is common for the title of a treatise (which normally includes the name of the author in the genitive) to be repeated at the end of the text, thereby marking its conclusion.

The first treatise is transmitted in twenty-nine manuscripts, the earliest of which are the twelfth-century Venetus Marcianus gr. app. cl. VI/3,[249] where in imperfect form it surrounds part of Aristoxenus's *Harmonica* as a marginal text added by a thirteenth-century hand, and Venetus Marcianus gr. app. cl. VI/10,[250] where it appears together with the second treatise. It is commonly transmitted with Bellermann's Anonymous either preceding or following; sometimes with the treatise of Manuel Bryennius or Aristides Quintilianus replacing Bellermann's Anonymous; and occasionally with the entire complex in varying orders. The strong association of the "Bacchius" treatises with Bellermann's Anonymous suggests that the scribes regarded them as later treatises in the Byzantine tradition, which is certainly not impossible.

The first treatise is divided into two large parts: the initial eighty-eight questions and answers deal with definitions of common terms and concepts in harmonics, while questions 89–101 deal with definitions in rhythmics (a question-and-answer complex is occasionally replaced by a simple declarative statement).[251] The topics can be readily displayed in tabular form:

---

[248] For a comprehensive list of editions and translations of the treatises of Bacchius and Dionysius, see the Bibliography under the respective names.

[249] Mathiesen, *RISM BXI*, 270.

[250] Mathiesen, *RISM BXI*, 273.

[251] For the sake of convenience, the numbering preserves that of Jan's edition, which is not, however, based on any indications in the manuscripts.

1. What is music and who is a musician?
2. How does music arise and what sorts of things arise by nature and by practice?
3. Of what is music compounded?
4. What is a note in general?
5. What is a scale?
6. What is an interval?
7. What is the least part of something sung?
8. What is the least of the intervals and what is a diesis, the double of the diesis, and the double of the semitone?
9. What is a tone?
10. What is consonance?
11. How many and which are the species of consonance in the Perfect System, and which notes show them?
12. The fourth, fifth, octave, octave-and-a-fourth, and double octave are composed of how many tones?
13. How many and which are the intervals of a fourth in the range of the double octave?
14. How many and which are fifths?
15. How many and which are octaves?
16. How many and which are octave-and-a-fourths?
17. How many and which are octave-and-a-fifths?
18. How many are double octaves?
19. What is melos?
20. What is a pycnon?
21. What is genus and how many and which genera are sung?
22. How is the harmonic genus sung?
23. How is the chromatic genus sung?
24. How is the diatonic genus sung?
25. According to us, the diatonic is not sung in the order of a pycnon. Why is that?
26. What is a tetrachord?
27. How many and which are species of tetrachords?
28. How many and which are tetrachords in the Immutable System?
29. How many and which are notes in the Immutable System?
30. How many and which of these are stationary?
31. How many and which are movable?
32. How many and which are the low tones of pycna?
33. How many and which are the highest tones of enharmonic, chromatic, and diatonic pycna?
34. How many and which are not part of a pycnon?
35. Why do we say that notes are stationary?
36. The movable notes are bounded by these. Through them, all intervals descend or ascend, except two.[252]
37. Which are these two, how do they move, and in what genus?
38. How many and which conjunctions arise in these, and which notes join them?
39. What is disjunction, how many and which ones, and by which notes?
40. How are the species consonant with one another?
41. What is eklusis?
42. What is ekbole?

---

[252] Eklusis and ekbole (see pp. 358–61 and 537 *supra*), which are further defined in §§37 and 41–42.

43. How many and which are the species of notes, and which are hypatoid, parhypatoid, and lichanoid?
44. How many and which are the positions of the voice?
45. How many and which are the conditions of melody? What is descent, ascent, hesitation, and stasis?
46. Those singing three or seven modes sing which ones?
47. Which of the modes is higher, what are the rest of the modes in descending order, and what intervals separate them?[253]
48. What is a mode?
49. What is melos of succession?[254]
50. How many and which are the modulations?
51. What is modulation in scale?
52. What is modulation in genus?
53. What is modulation in mode?
54. What is modulation in ethos?
55. What is modulation in rhythm?
56. What is modulation in the tempo of rhythm?
57. What is modulation by thesis in rhythmic composition?
58. What is modulation?
59. What is dissonance?
60. What is unison?
61. What is paraphonia?[255]
62. What is a diagram?
63. What type of chords [e.g., tetrachord, pentachord, etc.] are the synemmenon and diezeugmenon?
64. What are composite and incomposite intervals in general?
65. How do we define the mese?
66. How many dieses are in the tone and in the semitone?

* * *

67. What is the first element that pertains to music? Cf. §§4 and 29–37.
68. In how many ways do we use the term "tone" in music and what is a tone? Cf. §§6–18.
69. How many and which are the genera of notes? Cf. §§4 and 29–37.
70. How many and which are the species of notes? Cf. §§4 and 29–37.
71. How many and which are the species of consonance? Cf. §§4 and 29–37.
72. Is an interval perceived by hearing or by intellection? Cf. §§6–18.
73. By what magnitude is an interval known? Cf. §§6–18.
74. How many perfect scales are in the Immutable System? Cf. §§26–40.
75. How many species of fourth are there? Cf. §§26–40.
76. How many species of fifth? Cf. §§26–40.
77. How many species of octave? Cf. §§26–40.
78. What is melos? Cf. §19.
79. What is genus? Cf. §§20–25.

---

[253] These are seven basic "modes" (Mixolydian, Lydian, Phrygian, Dorian, Hypolydian, Hypophrygian, and Hypodorian) described in the previous question, and the intervals between them follow the pattern also described by Cleonides and Aristides Quintilianus. See pp. 385–86 and 533–36 *supra*.

[254] On succession, see pp. 389 and 537 *supra*.

[255] See pp. 417 and 502 *supra*.

80. There are seven positions of tetrachords by which melos is defined: conjunction, disjunction, subdisjunction, adjunction, subconjunction, paradisjunction, and superdisjunction. Cf. §§44–45.
81. What is conjunction? Cf. §§44–45.
82. What is disjunction? Cf. §§44–45.
83. What is subdisjunction? Cf. §§44–45.
84. What is adjunction? Cf. §§44–45.
85. What is subconjunction? Cf. §§44–45.
86. What is paradisjunction? Cf. §§44–45.
87. What is superdisjunction? Cf. §§44–45.
88. How many and what are the types of modulation? Cf. §§50–58.
89. All species of meter and mixed rhythm are measured by syllables, feet, and catalexes.
90. What is a syllable?
91. What is *basis*?
92. What is catalexis?
93. What is rhythm?
94. From how many and what sort of chronoi is rhythm combined?
95. What is a short, a long, and an irrational?
96. How many of these chronoi are combined in rhythm?
97. What is a form, a name, and a function?
98. What is an arsis and a thesis?
99. Some rhythms are simple, some are complex.
100. How many and which rhythms are there? How many are simple and how many are complex?
101. What are the ten types of simple rhythms?

For the most part, Bacchius's catechism is dominated by the Aristoxenian approach. For example, in the answer to question 8, the tone is clearly and without apology described as comprised of two semitones and four dieses. Likewise, in response to question 12, Bacchius describes the sizes of the fourth, fifth, octave, octave-and-a-fourth, octave-and-a-fifth, and double octave simply in terms of the number of tones and semitones; no Pythagorean ratios are ever employed, and there is no hint of the controversies surrounding these measurements.[256]

Nevertheless, Bacchius's treatise is not merely an interrogatory reflection of the Aristoxenian tradition as conveyed by Cleonides. The treatises of Gaudentius, Aristides Quintilianus, and to some extent Ptolemy had blurred distinctions among the Pythagoreans, Harmonicists, and Aristoxenians to such a degree that by the time of Bacchius, neither the questions nor the answers were entirely clear. In fact, within the first part, a certain amount of repetition occurs, especially in questions 67–88, regarded by Jan as representing a rather inept supplement in which the Aristoxenian tradition of the first sixty-six questions is mixed with later theory.[257] The traditional topics of notes, intervals, scales, genera, tonoi, modulation, and melic composition are therefore explored several times with different types of questions and occasionally with conflicting answers, some of which (11, 13–18, 29–34, and 38–42) make use of Alypian musical notation.

---

[256] See pp. 327–29, 349, and 443–44 *supra*.

While almost nothing in the treatise is completely new, several of the answers, especially in the section on rhythmics, provide useful clarification or confirmation of other sources. For example, questions 37, 41, and 42 provide confirmation of the definitions of eklusis and ekbole that appear in Aristides Quintilianus's *De musica* (1.11); questions 50–58 combine elements of rhythmic and melic modulation to create a somewhat fuller definition of modulation, although in question 88 the treatise reverts to a simple description of the four traditional melic types; and the answer to question 72 seems quite conscious of addressing the complementary relationship of the senses and intelligence in forming musical judgments, a relationship observed by both Ptolemy and Gaudentius:

> Is an interval perceived by hearing or intellection?
>
> Intellection. If it were by hearing, even a layman who hears an aulete or a string-player or a singer would know what an interval is. But according to some, it seems to be intellection and hearing, for it is impossible to have intellection without hearing things.[258]

Questions 80–87 expand on the traditional distinctions of conjunction and disjunction by introducing and defining a series of related terms. Subdisjunction (ὑποδιάζευξις) describes two tetrachords set an octave apart, such as the hypaton and diezeugmenon or the meson and hyperbolaion; adjunction (ἐπισυναφή), three consecutive conjunct tetrachords, such as the hypaton, meson, and synemmenon; subconjunction (ὑποσυναφή), two tetrachords with the interval of a fourth between them, such as the hypaton and synemmenon; paradisjunction (παραδιάζευξις), two tetrachords that overlap at the interval of a tone, such as the synemmenon and diezeugmenon; and superdisjunction (ὑπερδιάζευξις), two tetrachords with the interval of an octave between them, such as the hypaton and hyperbolaion. These are certainly not Aristoxenian terms, since with the exception of paradisjunction, they describe relationships that could hardly occur within Aristoxenus's theory of musical logic. Rather, they exhibit a purely intellectual propensity for defining every possible relationship among the structural components of harmonics.

---

[257] Jan, *Musici scriptores graeci,* 285–90.

[258] Αὐτὸ οὖν τὸ διάστημα νοητόν ἐστιν ἢ ἀκουστόν; Νοητόν. εἰ γὰρ ἦν ἀκουστὸν, καὶ ὁ ἰδιώτης ἀκούων αὐλητῶν ἢ ψαλτῶν ἢ ᾠδῶν ᾔδει ἂν τί ἐστι τὸ διάστημα. — Κατ᾽ ἐνίους δὲ νοητὸν καὶ ἀκουστὸν δοκεῖ εἶναι· ἀδύνατον γάρ ἐστι νοῆσαι μὴ ἀκούσαντα (Jan 307.20–24). On Ptolemy and Gaudentius, cf. pp. 438 and 500.

Like the preceding eighty-eight questions, the second part of the first treatise, dealing with rhythmics, is primarily derived from Aristoxenian theory.[259] Question 93 (What is rhythm?), however, elicits an answer that does contain material not found elsewhere, and moreover, material that is attributed to much earlier authorities:

> A measuring of chronos when there is a certain sort of movement; according to Phaedrus, rhythm is the measured setting of syllables placed one to another in a certain way; according to Aristoxenus, rhythm is chronos divided with a view to each of the things that can be rhythmically organized; according to Nicomachus, it is orderly motion of chronoi; according to Leophantus, it is a composition of chronoi considered in proportion and symmetry to each other; and according to Didymus, it is a configuration of a certain sound—sound configured in a certain way makes rhythm, and rhythm arises either in diction or melos or bodily motion.[260]

The definition attributed to Aristoxenus is close to one surviving in his *Elementa rhythmica* 9 ("chronos is divided by the things rhythmically organized with respect to the parts of each of them"[261]), which also identifies diction, melos, and bodily motion as the three rhythmically organized elements of music, and it certainly accords as well with the section on rhythmics in Aristides Quintilianus's treatise. This may bolster confidence in the accuracy of the other definitions, which contribute to the relatively meager remains of ancient Greek rhythmic theory.[262]

---

[259] See pp. 334–44 *supra*.

[260] ῾Ρυθμὸς δὲ τί ἐστι; Χρόνου καταμέτρησις μετὰ κινήσεως γινομένη ποιᾶς τινος. κατὰ δὲ Φαῖδρον ῥυθμός ἐστι συλλαβῶν κειμένων πως πρὸς ἀλλήλας ἔμμετρος θέσις. κατὰ δὲ Ἀριστόξενον χρόνος διῃρημένος ἐφ᾽ ἑκάστῳ τῶν ῥυθμίζεσθαι δυναμένων. κατὰ δὲ Νικόμαχον χρόνων εὔτακτος κίνησις. κατὰ δὲ Λεόφαντον χρόνων σύνθεσις κατὰ ἀναλογίαν τε καὶ συμμετρίαν πρὸς ἑαυτοὺς θεωρουμένων. κατὰ δὲ Δίδυμον φωνῆς ποιᾶς σχηματισμός.—ἡ μὲν οὖν φωνὴ ποίως σχηματισθεῖσα ῥυθμὸν ἀποτελεῖ, γίνεται δὲ οὗτος ἢ περὶ λέξιν ἢ περὶ μέλος ἢ περὶ σωματικὴν κίνησιν (Jan 313.1–12). Phaedrus may be the fabulist (ca. 15 B.C.E.–50 C.E.), but it is impossible to be sure; the definition attributed to Nicomachus does not appear in any of his surviving works; Leophantus is otherwise unknown; and Didymus may be the same theorist known to Ptolemy (see p. 457, n. 185 *supra*) and Porphyrius (see pp. 514–17 *supra*).

Parts of the first treatise are also preserved in an untitled anecdoton surviving in several manuscripts. In each case, the anecdoton follows a group of unattributed excerpts from Theon's *Expositio rerum mathematicarum ad legendum Platonem utilium,* and it is usually followed in turn by a fragment of text corresponding in part to Bellermann's Anonymous, section 103.[263] The anecdoton, which does not preserve the questions and condenses the answers to some degree, is arranged as follows:

Anecdoton		**Bacchius**
1	=	11. How many and which are the species of consonance in the Perfect System?
2	=	44. How many and which are the positions of the voice?
3	=	45. How many and which are the conditions of melody? What is descent, ascent, hesitation, and stasis?
4	=	46. Those singing three or seven modes sing which ones?
		47. Which of the modes is higher, what are the rest of the modes in descending order, and what intervals separate them?
5	=	48. What is a mode?
		49. What is melos of succession?
6	=	11. Which notes show the species of consonance in the Perfect System?
7	=	12. The fourth, fifth, octave, octave-and-a-fourth, and double octave are composed of how many tones?

There is no obvious reason for this particular set of topics to have been extracted from Bacchius's treatise, but the anecdoton is typical of the way in which later Byzantine scholars adapted and appropriated earlier material in their own writings. The earliest of the manuscripts in which it appears is the eleventh-century

---

[261] Διαιρεῖται δὲ ὁ χρόνος ὑπὸ τῶν ῥυθμιζομένων τοῖς ἑκάστου αὐτῶν μέρεσιν (Pearson 6.15–16). See pp. 337–39 *supra.*

[262] For some discussions of which, see chapter 2, n. 43 *supra.*

[263] On the unattributed excerpts from Theon of Smyrna, see pp. 413–14 *supra.*

Heidelbergensis Palatinus gr. 281,[264] a manuscript closely associated with Michael Psellus (1018–ca. 1078), well known for his compendia on various subjects. Psellus himself quite possibly prepared the anecdoton, as well as the other musical excerpts with which it is associated.[265]

Manuel Bryennius does not incorporate the anecdoton as such into his *Harmonica*, but he does seem to have known and made use of Bacchius's *Introductio*. In particular, Book III, chapter 11 repeats the distinctive definitions of the seven types of conjunction and disjunction found elsewhere only in Bacchius's questions 80–87. While there could have been some earlier common source known to Bryennius, it is much more likely that he appropriated them from Bacchius. As has already been noted, Bryennius certainly knew the second treatise—that is, the one perhaps attributable to Dionysius—, and since this treatise is only transmitted together with the first treatise in all known manuscripts prior to the time of Bryennius,[266] he must surely have had both of them at his disposal.

The second treatise provides a further example of Byzantine appropriation. Bryennius quotes the first half almost verbatim—and of course without any attribution—in Book II, chapter 6, the chapter introducing the "harmonic canon" (περὶ τοῦ ἁρμονικοῦ κανόνος). To prepare his readers for the divisions displayed in the next nine chapters, Bryennius wished to show the fallibility of the senses, and the second treatise offered him a series of vivid examples illustrating "that every irrational sense provides only a rough and inexact impression of the respective subjects."[267] The eye can distinguish in broad terms such characteristics as color, quantity, size, distance, and direction, but it cannot detect subtle degrees of difference among or within these characteristics; likewise, the senses of smell, taste, and touch are equally imprecise.

---

[264] Mathiesen, *RISM BXI*, **14**. This manuscript is primarily devoted to the works of Psellus, Photius, Theodorus, and other Byzantine writers. The anecdoton also appears in **17**, **52**, **114**, **172**, **215**, and **250**. See pp. 651–54 *infra*.

[265] For a discussion of Psellus and his interest in ancient Greek music theory, see pp. 643–55 *infra* and Mathiesen, "Hermes or Clio," 8–14.

[266] In fact, it appears alone only in the sixteenth-century Parisinus gr. 3027 (Mathiesen, *RISM BXI*, **101**).

[267] Ὅτι δέ ἐστι πᾶσα ἄλογος αἴσθησις παχυμερῶς πάντων τῶν προκειμένων πραγμάτων ποιουμένη ἀντίληψιν καὶ οὐκ ἀκριβῶς (Jonker 174.12–13).

For the sense of hearing, the second treatise provides two distinctive examples of its imprecision. If a lyre were tuned by a skilled musician and then taken to another musician for tuning, the second musician would immediately make adjustments in the tuning on the basis of his own aural sense, which will be distinct and individual. If five lyres were carefully tuned to each other in succession and the first and last lyres were then compared, they would not sound in tune because the small variations in tuning that had occurred in each case would only be perceptible to the ear when they were magnified by comparing the initial and final tunings. Therefore, only through a process of weights and measures is it possible to come to a fully accurate understanding of such subtle differences, and this is the purpose of the harmonic canon. Bryennius does not include the theorems that originally concluded the second treatise because he intends the following chapters to convey a much more elaborate set of divisions. In any case, the theorems concluding the second treatise merely echo once again the traditional Pythagorean demonstrations of the basic consonances and the tone, as well as those showing that the octave-and-a-fourth cannot be a consonance and the tone cannot be divided into two equal parts.

The treatises of Bacchius and (perhaps) Dionysius were ideal sources for later writers looking for simple definitions, free of context and the complicated technical arguments characteristic of many of the other treatises. If either or both of them were actually written in late antiquity, it is unlikely they were intended for any but the most mundane purposes. Though a new point or observation occasionally emerges in these treatises, they convey most of all the sense of an ancient theoretical tradition now moribund.

Alypius

Like the other treatises of late antiquity, the *Introductio musica* of Alypius cannot be assigned a precise chronological position. In a sense, this hardly matters because with the exception of a few introductory sentences, it is not a treatise at all but simply a tabular description of the ancient Greek musical notation that has accordingly come to be known as "Alypian." With minor variations, this notation appears in every surviving fragment or piece of ancient Greek music, including the earliest fragments from Euripides's *Orestes* and *Iphigenia Aulidensis* and the Delphic hymns.[268] Since the notation is certainly not contemporary with the compilation of the tables, the date of the treatise is of relatively little importance in interpreting its content. Nevertheless, the period of composition is not wholly irrelevant.

Alypius's name is not mentioned by any of the Greek musical writers, but Cassiodorus includes him in his list of important Greek musical authors (*Institutiones* 2.5), together with Euclid (i.e., Cleonides), Ptolemy, and Gaudentius. The treatise may also have been known to Boethius: *De institutione musica* 4.3–4 employs Alypian notational symbols for the Lydian tonos in all three genera; however, the symbols are not attributed to Alypius and might have been derived from other sources, possibly including Nicomachus or Gaudentius.[269] Whether or not Boethius knew the treatise, the endorsement of Cassiodorus alone is sufficient to indicate that Alypius must have completed his *Introductio musica* prior to the sixth century C.E. Additional pieces of evidence pertain to the earlier terminus. First, the name "Alypius" is not otherwise attested prior to the fourth century; second, as has already been noted, writers securely dated prior to the third century exhibit a general lack of interest in musical notation; and third, the treatise is routine and devoid of any literary pretense. When all the evidence is taken together, it strongly suggests that Alypius was a younger contemporary of Gaudentius and Aristides Quintilianus. Thus, he most probably compiled his *Introductio musica* during the period between the latter part of the fourth century and the end of the fifth century C.E.[270]

The treatise is preserved in thirty-four manuscripts, the earliest of which is, once again, the twelfth-century Venetus Marcianus gr. app. cl. VI/3,[271] the same manuscript preserving the earliest version of Bacchius's treatise, added in the margins by a thirteenth-century hand. In view of Aristoxenus's dismissal of notation as useless for the study of harmonics, it is ironic that Alypius's treatise immediately follows Aristoxenus's *Harmonica* in the main body of this codex, an arrangement occurring at least as often in the codices as the more logical pairing of the treatises of Gaudentius and Alypius.

---

[268] See pp. 41–57, 110–21, and 149 *supra*.

[269] See p. 504 (and n. 18) *supra*.

[270] For a comprehensive list of editions and translations of the treatise, see the Bibliography under "Alypius."

[271] Mathiesen, *RISM BXI*, **270**.

A short section in prose precedes the tables and provides some preliminary definitions. Reflecting the later Aristoxenian tradition, Alypius observes that music (μουσική) embraces the three disciplines of harmonics (ἁρμονική), rhythmics (ῥυθμική), and metrics (μετρική). Harmonics, first in order and primary, is concerned with "a function critical and perceptive of musical and intervallic notes and the differences among them," a definition recalling the opening sentence of Ptolemy's *Harmonica*.[272] After listing the seven Aristoxenian topics of harmonics (notes, intervals, scales, genera, tonoi, modulation, and melic composition), Alypius states that he will begin by representing the fifteen modes (τρόποι) or tonoi, starting with the Lydian, in two sets of notational symbols (σημεῖα), one for text (λέξις) and one for instruments (κροῦσις), or, as they have come to be known in modern scholarship, vocal notation and instrumental notation. The prose section then concludes with the names of the stationary and movable notes, together with incomplete observations about their positions within the pycnon. This much could have been readily paraphrased from material in the treatises of Cleonides and Aristides Quintilianus, although Alypius's treatment is far from complete.

Inasmuch as every surviving version of the treatise breaks off before all the tables have been presented, it is possible that additional prose discussions of the seven Aristoxenian topics were originally included—or at least intended by the author. When Alypius states in the introductory section that he wishes to begin by representing the notation of the modes, a continuation of the treatise beyond the tables is surely implied. Moreover, Gaudentius twice refers to discussions of notation that are to be found in the "Introductions,"[273] and if Alypius's *Introductio musica* was typical of the sort of treatise Gaudentius had in mind, there should have been more to it in its original state. But even if a portion of the treatise following the tables has been lost or was never completed, the tables themselves are of great value because they provide the most complete record of the notational symbols, a basis for determining the system on which the notation is based, and a means for transcribing the existing pieces of music.

---

[272] κριτικήν τινα δύναμιν ἔχουσα καὶ καταληπτικὴν τῶν ἐμμελῶν καὶ διαστηματικῶν φθόγγων καὶ τῶν ἐν αὐτοῖς γινομένων διαφορῶν (Jan 367.7–9). Cf. Ptolemy's definition: "Harmonics is a function perceptive of the differences among sounds with respect to high and low; sound is an effect of beaten air—the first and most fundamental of things heard" (Ἁρμονική ἐστι δύναμις καταληπτικὴ τῶν ἐν τοῖς ψόφοις περὶ τὸ ὀξὺ καὶ τὸ βαρὺ διαφορῶν, ψόφος δὲ πάθος ἀέρος πλησσομένου—τὸ πρῶτον καὶ γενικώτατον τῶν ἀκουστῶν [Düring 3.1–3]). See p. 437 *supra*.

[273] See pp. 507–8 *supra*.

According to Cleonides (section XII) and Aristides Quintilianus (1.10), Aristoxenus identified thirteen tonoi, to which, Aristides Quintilianus adds, the "younger theorists" (οἱ νεώτεροι) appended two more, expanding the number to fifteen.[274] In this arrangement, each of the five ethnic tonoi (Lydian, Aeolian, Phrygian, Iastian, and Dorian) is joined by a low (ὑπο-) and high (ὑπερ-) form. Alypius follows this later tradition in his tabular representations of the tonoi: the table for each basic tonos is immediately joined by tables for the low and high forms (e.g., Lydian, Hypolydian, Hyperlydian, Aeolian, Hypoaeolian, Hyperaeolian, and so on). In each case, Alypius provides the name of the note (proslambanomenos, hypate hypaton, and so on); a short description of the shapes of the two notational symbols (e.g., defective zeta and horizontal tau), vocal and instrumental; and the notational symbols themselves. The first fifteen tables provide the notation for the tonoi in the diatonic genus, after which the cycle is repeated for the chromatic genus.

The cycle was apparently repeated a third time for the enharmonic genus, but the tables are imperfect for the Aeolian tonoi and break off altogether in the middle of the Hyperphyrgian tonos. These general defects already appear in Venetus Marcianus gr. app. cl. VI/3[275] and are substantially repeated in all other manuscripts and later editions of the treatise. Moreover, with the exception of the tables for the Lydian tonos, the symbols in the few surviving tables of the enharmonic genus are identical to those in the corresponding tables of the chromatic genus. The only difference appears in the notation for the chromatic and enharmonic genera of the Lydian tonos, where a stroke (/ or \) passes through the symbols for the upper movable notes of each tetrachord (that is, the lichanos hypaton, lichanos meson, paranete synemmenon, paranete diezeugmenon, and paranete hyperbolaion) in the chromatic genus. If this were an accurate reflection of the notational distinction between the chromatic and enharmonic genus, it would be a simple matter to restore the missing tables, but the evidence is hardly compelling. In the first place, if the stroke were an indication of the chromatic genus, it should appear in the other chromatic tables as well. But as the symbols for the upper movable notes of the tetrachords in the chromatic tables are already distinct from those in the diatonic tables, there is no obvious reason for adding the further distinction of the stroke. On the other hand, if the original purpose of the stroke was to indicate the enharmonic versions of the chromatic symbols, perhaps at some point the symbols for the enharmonic and chromatic genera of the Lydian tonos were inadvertently exchanged as the tables were being copied, with the descriptions themselves subsequently modified to accord with the symbols.[276] It is also conceivable, especially in view of the well-attested decline of the enharmonic by the late fourth century B.C.E., that exactly the same notation was in fact used for the chromatic and enharmonic genera by the time the notation reached the form Alypius describes, leaving it up to the performers to decide which genus was most appropriate to the piece. In this case, the stroke might simply have been the work of an enterprising copyist who thought some distinction between the two genera was necessary; inasmuch as the stroke was not part of the tradition, it was not preserved—with the single exception of the Lydian tonos in the chromatic genus—as the tables were copied and recopied over the centuries. While numerous other hypotheses could be formulated, no fully convincing solution to the anomalies in the tables is finally possible.

---

[274] See pp. 533–34 *supra*.

[275] For a full description of the defects, see Mathiesen, *RISM BXI*, **270**.

Even without the enharmonic set, the tables of Alypius provide clear confirmation of much that is written about the tonoi in the earlier treatises. In the most obvious instance, each of the tonoi following the lowest (Hypodorian) is one semitone higher overall, and the proslambanomenoi of the lowest and highest (Hyperlydian) tonoi span an octave and a tone, just as is described by the theorists.[277] The overall span between the proslambanomenos of the lowest tonos and the nete hyperbolaion of the highest is three octaves and a tone. Alypius does not lay out his tables to show this relationship among the tonoi, but it is shown in Aristides Quintilianus's diagram laid out "akin to a wing." The tables of Alypius can be conveniently illustrated in a composite form (figure 104).[278]

---

[276] It is equally possible that the entire complex of symbols and descriptions was copied in the wrong place. As the initial scale in each subordinate set of tables, these are also the most likely places for a scribe to make any of the hypothetical mistakes.

Although the tables of Alypius do not make it immediately apparent, the symbols for both the vocal and instrumental notation follow a triadic pattern in which the first symbol represents a certain pitch; the second, the pitch raised by a diesis (chromatic or enharmonic); and the third, the pitch raised by two dieses (the dieses might be as small as quarter tones or as large as semitones). In the vocal notation, the triads are formed of three-letter groups (e.g., Α-Β-Γ, Δ-Ε-Ζ, and so on), while in the instrumental notation, they are formed of a basic shape rotated 90° and 180° around a central axis (or sometimes reflected). The basic set of symbols for the instrumental notation, which is generally thought to be the earlier, accounts for two octaves (A–a'[279]) of the span of three octaves and a tone; two additional symbol-triads are added below this set (on F and G); above this, five of the symbol-triads are

---

[277] See pp. 385–87 and 533–35 *supra*.

[278] For Aristides Quintilianus's diagram, see pp. 535–36 *supra*. In figure 104 (adapted from Jan, *Musici scriptores graeci*, folding table), the symbols for the chromatic inflection of the lichanos or paranete are given in parentheses, the diatonic inflection in brackets; the pitch of the chromatic inflection is a half-step lower than the pitch notated for the diatonic inflection. The letters across the top of the chart indicate the following notes: a, proslambanomenos; b, hypate hypaton; c, parhypate hypaton; d, chromatic lichanos hypaton; e, diatonic lichanos hypaton; f, hypate meson; g, parhypate meson; h, chromatic lichanos meson; i, diatonic lichanos meson; j, mese; k, trite synemmenon; l, chromatic paranete synemmenon; m, diatonic paranete synemmenon; n, nete synemmenon; o, paramese; p, trite diezeugmenon; q, chromatic paranete diezeugmenon; r, diatonic paranete diezeugmenon; s, nete diezeugmenon; t, trite hyperbolaion; u, chromatic paranete hyperbolaion; v, diatonic paranete hyperbolaion; w, nete hyperbolaion. White noteheads indicate immovable notes; black, movable. The numbers on the left side of the diagram indicate the following tonoi: 1, Hypodorian; 2, Hypoiastian; 3, Hypophrygian; 4, Hypoaeolian; 5, Hypolydian; 6, Dorian; 7, Iastian; 8, Phrygian; 9, Aeolian; 10, Lydian; 11, Hyperdorian; 12, Hyperiastian; 13, Hyperphrygian; 14, Hyperaeolian; 15, Hyperlydian.

[279] As always, all the pitches in this description and in the charts should be taken as merely conventional, not as indicative of any absolute pitch.

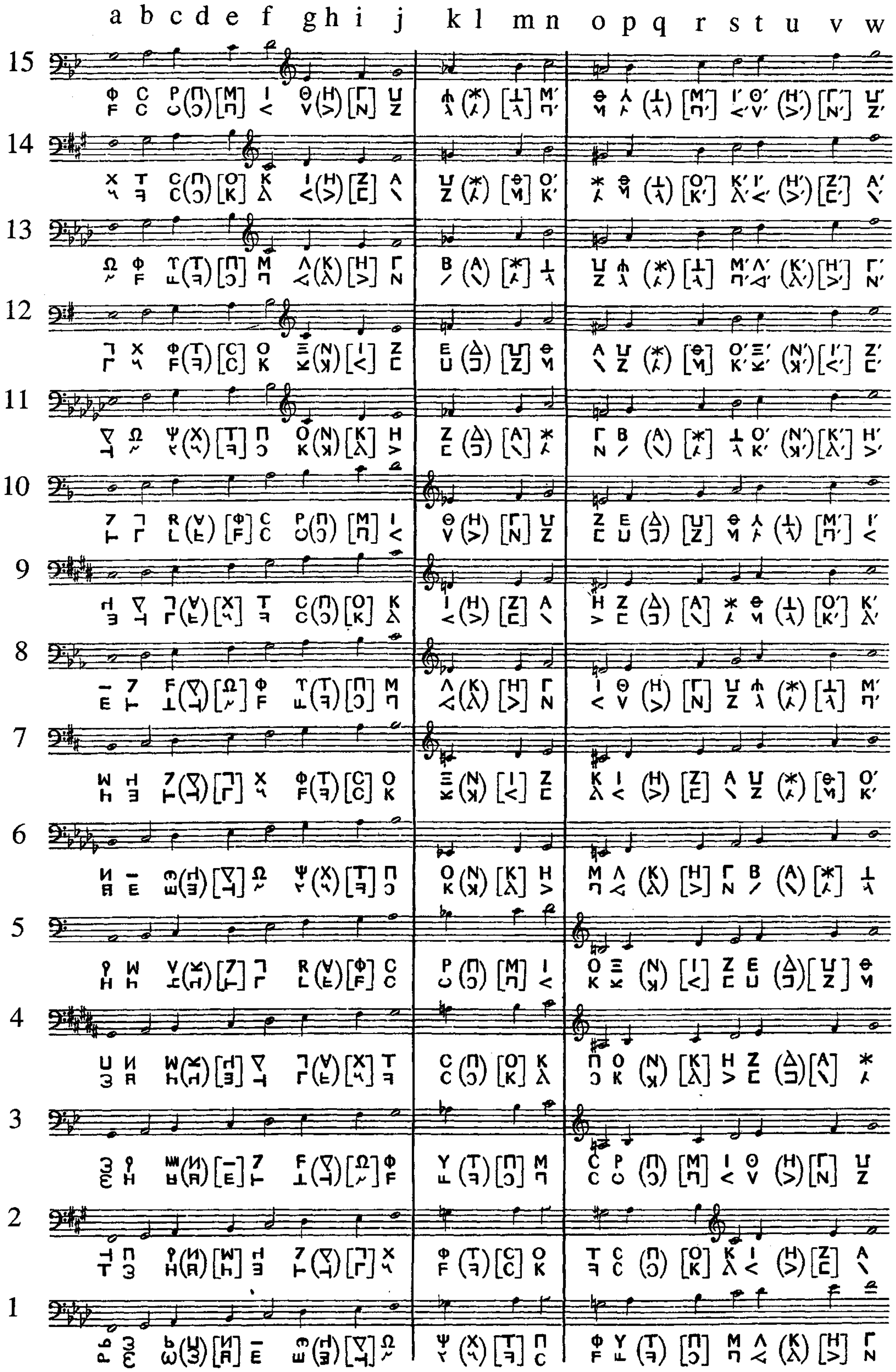

a b c d e f g h i j k l m n o p q r s t u v w
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1

Figure 104.

repeated with the addition of an apostrophe to extend the upper range (on b'–f"); and a final symbol (Z') is added for the highest pitch (g"). Various alphabetic origins have been proposed for the instrumental symbols,[280] but the shapes may just as well be purely arbitrary. The basic set of symbols for the vocal notation, on the other hand, makes use of the Ionic alphabet and must therefore not be much older than the fifth century B.C.E. With only twenty-four characters, arranged in eight symbol-triads, this set can account for only a single octave. In Alypius's pattern, the octave (f–f') falls in the center of the overall span. In order to extend this pattern to match the instrumental notation, the first seven triads appear in inverted or otherwise "defective" forms (as Alypius describes them) below the basic set (on F-e); the two final triads T-Y-Φ and X-Ψ-Ω are inverted and added above the basic set (for g' and a'); just as in the instrumental notation, five of the symbol-triads are repeated with the addition of an apostrophe to extend the upper range (on b'–f"); and a final symbol (℧') is added for the highest pitch (g")

The modern staff cannot represent the subtle gradations of pitch (and functions of pitch within a melodic complex) indicated by Alypian notation, but a general idea of the inflections indicated within each symbol-triad may be gathered from the following display (figure 105).[281] Pattern I represents the vocal notation; pattern II, the instrumental. In each case, the symbols in row 1 represent the staff pitch; the symbols of row 2 represent the pitch raised by an enharmonic or chromatic diesis; and the symbols of row 3 represent the pitch raised by two enharmonic or chromatic dieses.

---

[280] See, for example, Rudolf Westphal, *Harmonik und Melopöie der Griechen* (Leipzig: B. G. Teubner, 1863), 389ff; idem, *Die Musik des griechischen Alterthumes* (Leipzig: Veit, 1883), 155ff; D. B. Monro, *The Modes of Ancient Greek Music* (Oxford: Clarendon, 1894), 68–75; Otto Gombosi, *Die Tonarten*, 78–82; André Bataille, "Remarques sur les deux notations mélodiques de l'ancienne musique grecque," *Recherches de papyrologie* 1 (1961): 5–20; Heinrich Husmann, *Grundlagen der antiken und orientalischen Musikkultur* (Berlin: W. de Gruyter, 1961), 78–80; Jacques Chailley, "Nouvelles remarques sur les deux notations musicales grecques," *Recherches de papyrologie* 4 (1967): 201–16; West, "Analecta musica," 36–42; and idem, *Ancient Greek Music*, 259–63.

[281] Henderson, "Ancient Greek Music," 358.

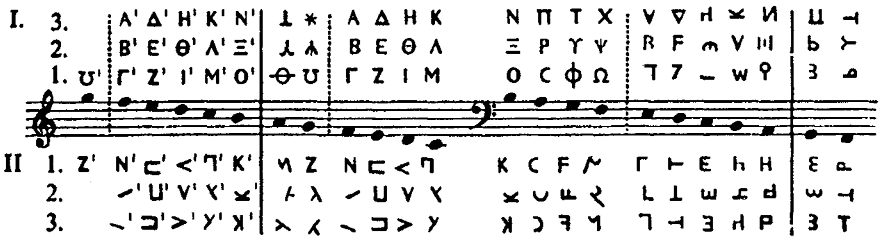


Figure 105.

While this system might seem unnecessarily redundant in the notation of pitch, especially if rows 2 and 3 are envisioned as sounding a semitone and tone higher than row 1, the purpose of the notation was not to signify abstract pitches but rather to signify specific pitches and functions of notes in a tonos. Thus, in terms of function, the symbols of row 1 could represent either fixed or movable notes within a tetrachord; the symbols of row 3 could represent either fixed or upper movable notes of a tetrachord; and the symbols of row 2 could represent only the lower movable note of a tetrachord.

Although the logic of the arrangement of the patterns for a system of notation intended to represent fifteen tonoi extending over the range of three octaves and a tone has long been the object of controversy and various conjectures for "improvements," including a proposal that the vocal pattern might originally have begun a third higher,[282] the arrangement is not as illogical and inconsistent as it may seem. In fact, it accords quite well with earlier theoretical testimony about the tonoi.

If, as is commonly assumed, the instrumental notation was the older system, it probably originated as a tablature and needed therefore only a sufficient number of symbols to indicate the various possible notes in the Perfect System. The symbol-triads arrayed in figure 105 on the central two octaves A–a' could do just that. Moreover, in this placement, the sequence of symbols in their upright form corresponded to the sequence of tones and semitones in the Greater Perfect System.

---

[282] Ibid., 358–63. For comprehensive studies of the notational system, see Egert Pöhlmann, *Griechische Musikfragmente: Ein Weg zur altgriechischen Musik*, Erlanger Beiträge zur Sprach- und Kunstwissenschaft, vol. 8 (Nürnberg: Hans Carl, 1960); and J. Murray Barbour, "The Principles of Greek Notation," *Journal of the American Musicological Society* 13 (1960): 1–17.

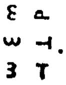
The vocal notation, by contrast, seems to have been associated from the first with the various tonoi; while these were not set on any fixed pitch as an entire complex, they did bear intervallic relationships one to another. When the vocal and instrumental notations were linked—whether this occurred first in the displays that became common in the treatises of late antiquity or whether it had already occurred in practice—, additional symbol-triads were needed to modify the system of tablature into a system that now indicated relative pitch. Likewise, when the notational focus changed from tablature to a relative pitch-based system, the vocal notation became dominant because as an alphabetic notation, it was inherently more logical and intuitive. This change in focus is evident in the descriptions of Aristides Quintilianus and Gaudentius, both of whom clearly have the vocal notation in mind when they describe the arrangement of the symbols. Both Aristides Quintilianus and Gaudentius indicate that the ascending notation of the tonoi followed the alphabet in reverse order. Aristides Quintilianus begins with a supine Ω and moves up by dieses until he comes to the fourth sign, Φ, no doubt also intended to be supine, although he does not actually describe it; this symbol is defined as representing the proslambanomenos of the Hypodorian tonos, a tone higher than supine Ω.[283] Gaudentius omits discussion of the symbols below the proslambanomenos of the Hypodorian tonos—the purpose of which remains unclear in Aristides Quintilianus's description—and simply states that this proslambanomenos was notated with a supine half-phi (—◡ or —◠). While Gaudentius includes the instrumental symbols in his descriptions of the pairs, he clearly regards the vocal notation as regulating the pattern.[284] These descriptions accord reasonably well with the tables of Alypius, which describe the vocal and instrumental symbols for the proslambanomenos of the Hypodorian tonos as "reversed supine half-phi and supine half-phi."[285] If the pattern were then extended upward, following the inverted with the upright forms, the triad A-B-Γ would fall just where it does in figure 105.

---

[283] Aristides Quintilianus *De musica* 1.11.

[284] Gaudentius *Harmonica introductio* 21–22.

[285] ἡμίφι πλάγιον ἀπεστραμμένον καὶ ἡμίφι πλάγιον (Jan 382.3–4).

The instrumental notation was not simply aligned with the bottom of the vocal notation because of its strong traditional association with the "natural" form of the Perfect System, which in the new system of tonoi now became associated with the Lydian tonos and its hypo- and hyper- forms, the very tonoi that both Alypius and Gaudentius place first in their tables.[286] Thus, since two more symbol-triads were needed in the vocal notation to match the upper two triads of the instrumental notation, it was reasonable to begin once again with the alphabet in reverse order, that is, with the triad X-Ψ-Ω, now rotated on a different axis. For its part, the instrumental notation needed two symbol-triads to match the two lower triads of the vocal notation, and in fact these seem to have been adapted from their counterparts in the vocal notation, in the first case by taking the note Gaudentius describes as a double sigma (ε) and rotating it 90° and 180° around a central axis, and in the second case by reversing or rotating all three symbols of the vocal triad, the upsilon losing its identity and becoming simply a reversed supine tau: .

At this point, the notation could accommodate an overall range of F–$b^{\flat}$' (see figure 105). With these pitches, every one of the thirteen tonoi attributed to Aristoxenus could be sung at least as far as its mese, while the Dorian tonos and all the lower tonoi could be sung in full, just as Aristides Quintilianus states (1.10):

> ... some of the tonoi are sung in their entirety, some are not. The Dorian is sung in full because the voice serves us as far as twelve tones and because its proslambanomenos is in the middle of the Hypodorian octave. For the rest, those lower than the Dorian are sung as far as the note consonant with the nete hyperbolaion.

A few lines later, he once again observes that the Dorian tonos defined an upper limit for the voice:

> If the lowest note of the song falls above the Dorian, beginning in a higher octave, we shall take it down an octave, ...[287]

---

[286] Henderson, "Ancient Greek Music," 361–63, reaches a similar conclusion. It seems likely that this association of the Lydian tonos with the natural form of the Perfect System was simply an accident of the notation, as opposed to a conscious preference for the older Lydian harmonia.

[287] οἱ μὲν μελῳδοῦνται διόλου, οἱ δὲ οὐχί. ὁ μὲν οὖν δώριος σύμπας μελῳδεῖται διὰ τὸ μέχρι τῶν ιβ̄ τόνων τὴν φωνὴν ἡμῖν ὑπηρετεῖσθαι καὶ διὰ τὸ μέσον αὐτοῦ τὸν προσλαμβανόμενον τοῦ διὰ πασῶν εἶναι ὑποδωρίου· τῶν δὲ λοιπῶν οἱ μὲν βαρύτεροι τοῦ δωρίου μέχρι τοῦ συμφωνοῦντος φθόγγου τῇ νήτῃ τῶν ὑπερβολαίων. ... εἰ δ᾽ ὁ

The final notes of the Dorian tonos are in fact the notes found in figure 105 in row 3 of the column on a' ($\overset{\perp}{\curlyvee}$, sounding b♭'). Likewise, the highest notes of the six ancient harmonia described by Aristides Quintilianus (1.9), those of the Dorian, are the notes in row 1 of this same column ($\overset{\ominus}{\curlyvee}$, sounding a').[288]

By the time the final two tonoi were added by the "younger theorists," a sufficient number of symbols would have been necessary to indicate any of the notes across a range of three octaves and a tone: this required the addition of symbols for b'–g''. As these formed octaves above existing notes, the most direct way to notate them was to repeat the symbols with the addition of some mark—in this case an apostrophe—to indicate their higher octave. The symbol-triads for b–f' were accordingly repeated for b'–f''; only a single symbol for g' was repeated because there was no need for any chromatic alterations of this final pitch. In fact, this is precisely the process described by Gaudentius, who states that musicians continued the primary pattern

> until the thirtieth degree of semitones [i.e., from F to b♭']. They signed the augmentation by semitone of the notes above these with the same signs over again by affixing an acute accent, beginning from the nineteenth degree, which has the sign omicron and kappa.[289]

In the vocal notation, the juxtaposition of these five upper sets, ending on O', with the former final symbol-triad ($\begin{smallmatrix}\perp\\ \curlyvee\\ \ominus\end{smallmatrix}$) naturally suggested to later scholars an irregularity in the structure, but in practical terms, the new symbols were perfectly sensible. Musicians had become familiar with a system of notation extending over two octaves and a fourth (F–b♭'), which was adequate for the description, and apparently the practice, of the older tonoi in use at least through the time of Aristoxenus. When it became neces-

---

βαρύτερος τῆς ᾠδῆς φθόγγος ὑπερεκπίπτει τοῦ δωρίου [τὸ] διὰ πασῶν ὀξὺς ὑπάρχων, ληψόμεθα μὲν αὐτοῦ τὸ διὰ πασῶν ἐπὶ τὸ βάρος (W.-I. 21.12–18, 22.6–9). The tonoi lower than the Dorian can, of course, only be sung as high as their respective netai hyperbolaion.

[288] See p. 532 *supra*. The ancient Dorian in Aristides Quintilianus *De musica* 1.9 should not be confused with the Dorian tonos in the tables of Alypius.

[289] μέχρι τριακοστοῦ στίχου τῶν ἡμιτονίων. τὴν δὲ ὑπὲρ ταῦτα κατ' ἡμιτόνιον παραύξησιν τῶν φθόγγων τοῖς αὐτοῖς σημείοις ἐξ ὑπαρχῆς ὀξείας προσθέντες ἐσημειοῦντο ἀπὸ τοῦ ἐννεακαιδεκάτου ἀρξάμενοι στίχου, ὃς ἔχει ου καὶ κάππα σημεῖον (Jan 350.4–9). In the chart described by Gaudentius (see figure 82, p. 507 *supra*), the note-pair omicron and kappa is the nineteenth pair.

sary to extend the range to accommodate the new higher tonoi, this was most easily and practically done through replication of the symbols at the octave, though later observers viewed the junction of symbols (at a' and b' in figure 105) as anomalous.

The surviving portion of Alypius's treatise includes no comment on rhythmic notation, and there is no way of knowing whether this would have formed a part of his treatment. Rhythmic signs do appear, however, in even the earliest musical fragments, and it is clear that the textual rhythm could be modified by the music, even though the rhythm of a piece of music was governed in general by the natural poetic rhythm of the text.[290] The sole surviving description of rhythmic notation is preserved only in Bellermann's Anonymous, which describes five types of signs: duration, ligation, articulation, division, and rest (figure 106):

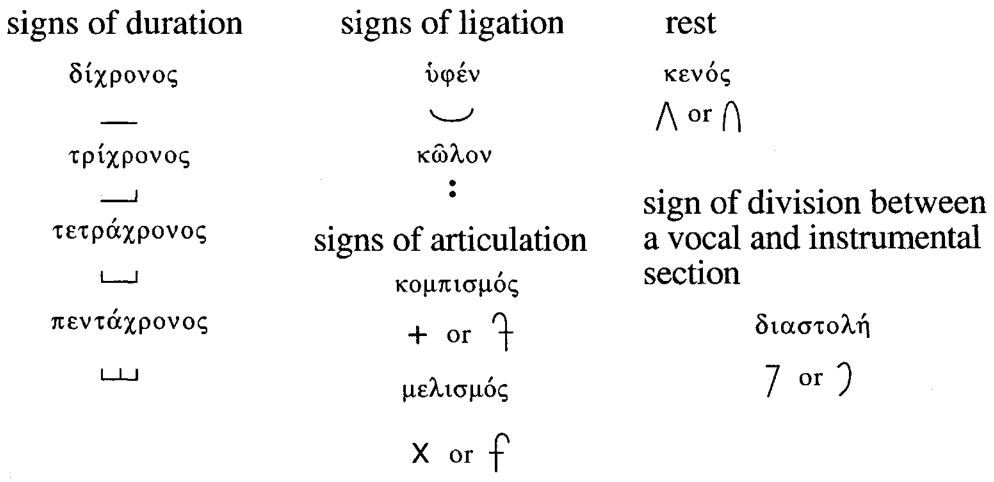

signs of duration
δίχρονος
τρίχρονος
τετράχρονος
πεντάχρονος
signs of ligation
ὑφέν
κῶλον
signs of articulation
κομπισμός
+ or
μελισμός
X or
rest
κενός
or
sign of division between a vocal and instrumental section
διαστολή
7 or

Figure 106.

The interpretation of these signs as they actually appear in pieces of music is not always certain, but in general, the durational signs increase the value of an individual note (or a group of notes linked by a ligation sign) two-, three-, four-, or five-fold; the signs of ligation normally indicate that a group of notes is equivalent to whatever duration may be marked; the signs of articulation, which fall between the two repeated notes to which they apply, indicate either a hard (κομπισμός) or soft (μελισμός) articulation;

---

[290] Extended descriptions of which appear in Aristoxenus *Elementa rhythmica* and Aristides Quintilianus *De musica* 1.13–29, as well as in numerous specialized Greek treatises on rhythm and meter. See pp. 334–44 and 538–41 *supra*.

the rest (κενός) may appear alone or be combined with one of the durational signs; and the sign of division (διαστολή) marks the beginning of an instrumental interjection within a vocal piece.[291]

In his *Elementa harmonica I* (section I/B/10), Aristoxenus dismissed notation as useless to scientific inquiry, and theorists ignored it for the next several centuries. Nevertheless, it is clear that several systems of notation existed during the period between the fourth century B.C.E. and the fourth century C.E. Falling in the province of the practitioner rather than the theorist, musical notation must have been developed and passed on as a skill together with other details of instrumental technique and performance practice. The earliest notated fragments of Greek music, which date from the third century B.C.E., indicate that the system described by Alypius must have been largely in place by that time. Although these fragments and the other surviving pieces of ancient Greek music do exhibit occasional symbols not immediately recognizable from any of the theoretical treatments, they are, on the whole, clearly notated in the Alypian system, some in a combination of vocal and instrumental notation, and others in a single predominant form. Performers—especially professionals—no doubt learned how to interpret the unusual symbols and special combinations as part of their training. As these traditional skills began to fade in late antiquity, a few writers undertook to codify the basic notational symbols. Alypius was the most systematic, and while his tables are incomplete and leave certain questions unanswered, their symbols do enable the surviving notation to be read for the most part in a sensible and musically coherent manner.

Intrigued by his praise for Alypius, later readers of Cassiodorus's *Institutiones* seeking a copy of the treatise probably had some difficulty finding one: like the treatise of Gaudentius, the tables of Alypius are preserved in a comparatively small number of manuscripts. Of course, these readers would not have known from Cassiodorus's citation that Alypius described a system of notation, a characteristic that might have added special interest to the treatise for its relationship to the descriptions preserved in Boethius's *De institutione musica* 4.3–4. But in any event, the tables seem to have been largely forgotten and generally ignored by later writers—East and West—until the time of Girolamo Mei and Vincenzo Galilei.[292]

---

[291] Examples of durational signs appear in the two Euripidean fragments, the hymns of Mesomedes, and the Epitaph of Seikilos (which also includes examples of signs of ligation), while examples of a diastole appear in the fragment from Euripides's *Orestes* (see pp. 56, 111–20, and 148–51 *supra*); and examples of the other signs appear in several of the other fragments (see Pöhlmann, *Denkmäler, passim*).

The conceptual brilliance of Aristides Quintilianus's treatise with its wealth of material stands in sharp contrast to the narrow didacticism of Bacchius's *Introductio artis musicae,* but both of them are typical of the extremes characterizing the last centuries before the fall of Rome in 455. Between these two extremes, the treatises of Gaudentius and Alypius are of inestimable value in providing the keys with which to decipher the musical notation, as well as much other valuable information. Apart from the technical matters of notation, none of these treatises fills major lacunae in the tradition, nor do they provide the type of critical engagement with the theory typical of the treatises of the second century C.E. If those treatises can be regarded as representing the first stages of scholarship in the field of ancient Greek music theory, the treatises of late antiquity might be seen both as developing the trends of scholarship and as diffusing the ancient traditions into the polarities of speculative (or mystical) and practical (or technical) music theory, around which later medieval and Renaissance music theory would develop.

Boethius, Cassiodorus, and Martianus Capella drew heavily upon the musical treatises of late antiquity together with those of Ptolemy and perhaps Nicomachus, clearly regarding this Greek literature as an important heritage to be preserved from a vanishing past. By providing a bridge between the Middle Ages and the ancient tradition, the later Greek treatises assume an unexpected importance in this heritage, the subject of our final chapter. Though the treatises of late antiquity are themselves remote from the tradition, in them, the dying embers of ancient Greek music theory come to life one last time before flickering out.

---

[292] For a discussion of which, see Palisca, *Humanism,* 46–47.

VII

The Tradition in the Middle Ages: Survival and Transmission

In the period between the last decades of the fifth century C.E. and the establishment of the universities at Bologna, Paris, Oxford, and Cambridge in the eleventh and twelfth centuries, Greek was largely forgotten in the West, and knowledge of the language that remained was primarily applied to theological and ecclesiastical matters rather than to the traditions of science and art. Even in the Eastern empire, the demands of church and state on the one hand and the political and religious threats of Islam on the other hardly provided an atmosphere in which the old traditions could retain their interest.

By contrast, the eastern migration of the Nestorians in the fifth century to escape their Byzantine persecutors established a Greek cultural center that was later assimilated by the ʻAbbāsid caliphs in the expansion of Islam following Muhammad's death in 632. As part of the process of assimilation in the eighth and ninth centuries, Greek technical and scientific treatises were translated into Arabic (in some cases through Syriac as an intermediate language), as was a substantial portion of the Greek philosophical tradition, especially the work of Plato and Aristotle. The *House of Wisdom,* established in 832 by the caliph al-Ma'mūn (reigned 813–33), provided support for the masters of Greek, Syriac, and Arabic charged with the task of translating this vast body of literature, and with the growth of the Islamic empire in North Africa and Spain, the newly translated literature traveled to regions where the original texts had never been known or had long since been forgotten. During the tenth century in Cordova, for example, the Umayyad caliphs assembled an impressive library of ancient learning, which later found its way to the rest of Europe through translation from Arabic to Latin.

While the outlines of this process are clear, the details of the translation, dispersion, retranslation, and gradual assimilation of this literature into the European music theory of the Middle Ages remain elusive, in part because so many of the intermediate works no longer survive. The *Kitāb al-fihrist* ("Index to Arabic Books") of Ibn Al-Nadīm, completed ca. 987 C.E., indicates that Arabic translations of the *Sectio canonis* and treatises by Aristoxenus (including *De principiis, Elementa harmonica,* and *Elementa rhythmica*), Nicomachus (apparently including the longer work promised in the *Manuale harmonices*), and Euclid (probably the treatise of Cleonides) were in circulation, and shortly thereafter, commentaries—now lost—on both the *Sectio canonis* and Cleonides's *Harmonica introductio* were written by the eleventh-century Egyptian physicist Ibn Al-Haitham (also known as Alhazan). Internal evidence in the treatises of Al-Kindī (d. ca. 874) and Al-Fārābī (d. ca. 950) makes it clear that Ptolemy's *Harmonica* and perhaps Aristides Quintilianus's *De musica* were also known at this time.[1]

Theorists such as Al-Kindī and Al-Fārābī made use of the material they learned from the Greek authors without engaging in mere slavish appropriation; rather, they adapted theoretical premises and details to the music of their own time. Receptive to the philosophical view of music as a paradigm for the larger harmony of the universe, Arabic theorists of the ninth and tenth centuries were nonetheless also quite interested in the physics of sound and the scientific classification of melodic and rhythmic elements. Some authors were willing to engage in pure speculation about musical phenomena, freely adapted from the Aristoxenian and Pythagorean traditions, but Al-Fārābī advocated that theory be based on musical practice. In fact, one class of treatise within the Arabic tradition emphasizes that theory and practice must complement one another for the perfection of music.[2]

---

[1] Relatively little attention has been paid to the role of Islamic scholarship in the preservation of Greek music theory. Henry George Farmer's "Greek Theorists of Music in Arabic Translation," *Isis* 13 (1930): 325–33, provides a preliminary study, but Amnon Shiloah's *The Theory of Music in Arabic Writings (c. 900–1900),* RISM BX (Munich: G. Henle, 1979) has prepared the ground for the more comprehensive study that is still lacking. Likewise, the influence of Arabic music theory on subsequent medieval Latin music theory has only been lightly explored by Farmer's *Historical Facts for the Arabian Musical Influence* (London: Wm. Reeves, 1930) and *Al-Fārābī's Arabic-Latin Writings on Music,* Collection of Oriental Writers on Music, vol. 2 (New York: Hinrichsen, 1965); and by Don M. Randel's "Al-Fārābī and the Role of Arabic Music Theory in the Latin Middle Ages," *Journal of the American Musicological Society* 29 (1976): 173–88. See also Henry George Farmer, "The Music of Islam," in *Ancient and Oriental Music,* ed. Egon Wellesz, New Oxford History of Music, vol. 1 (London: Oxford University Press, 1957), 421–77. For a general treatment of the transmission of Greek scientific literature, see David C. Lindberg, "The Transmission of Greek and Arabic Learning to the West," in *Science in the Middle Ages,* ed. David C. Lindberg, The Chicago History of Science and Medicine (Chicago: University of Chicago Press, 1978), 52–90.

Beginning in the late tenth century, scientific treatises in Arabic preserved in the Muslim courts of al-Andalus began to find their way into northern Europe in Latin translation. A few decades later, Hermannus Contractus (1013–1054) prepared an adaptation of one of these treatises, *De utilitatibus astrolabii,* for the monastery at Reichenau,[3] and it is quite possible he came in contact as well with traces of Greek music theory in the Arabic treatises. In the twelfth and thirteenth centuries, as a result of the *reconquista* of al-Andalus by the northern Christian states, a considerable amount of translation and adaptation of Arabic sources took place, especially by such figures as Dominicus Gundissalinus (fl. 1150), Gerard of Cremona (ca. 1114–1187), John of Seville (fl. 1133–1142), Robert of Chester (fl. 1141–1150), and Plato of Tivoli (fl. 1132–1146).

Emerging from this surge of translation, Al-Fārābī appeared as an authoritative link to the past through two treatises dealing with music, commonly though not securely attributed to him: *De scientiis* and *De ortu scientiarum.*[4] The section on music in *De scientiis* was known directly to Vincent of Beauvais (ca. 1190–1264), recommended by Roger Bacon (ca. 1214–1280) in his *Opus tertium,* and appropriated by Gundissalinus in his *De divisione*

---

[2] Shiloah, *Theory of Music in Arabic Writings,* 5–7. For French translations of many of the Arabic treatises, see Rodolphe d'Erlanger, *La musique Arabe,* 6 vols. (Paris: Paul Guenther, 1930–59).

[3] Lindberg, "Transmission of Greek and Arabic Learning," 60–61.

[4] Six other works by Al-Fārābī were translated during this period: *De naturali auditu, De causis, De intellectu et intelligibili, De syllogismo, De tempore,* and *Declaratio compendiosa super libris Rhetoricorum Aristotelis.* See Farmer, *Al-Fārābī's Arabic-Latin Writings on Music,* 17.

philosophiae. Jerome of Moravia, in his *Tractatus de musica*, paraphrases Al-Fārābī's general definition of music: "musica est quae comprehendit cognitionem specierum harmoniae et illud, ex quo componitur et quibus modis,"[5] as well as providing an entire chapter "De divisione musice secundum Alphorabium," placed between chapters providing comparable definitions of the divisions of music by Isidore of Seville and Boethius. Al-Fārābī's division of music into active and speculative parts, as well as his description of these parts, is reminiscent of Aristides Quintilianus's division and description of the theoretical and practical parts of music.[6] Through the intermediary of Gundissalinus's *De divisione philosophiae*, *De scientiis* was also known to Magister Lambert.[7] *De ortu scientiarum* seems to have been less well known, but it too reflects some traces of Aristides Quintilianus, especially in its view of music growing from the roots of meter, melos, and gesture, which are based on the senses of sight and hearing.[8]

A thread unquestionably connects ancient Greek and medieval Latin music theory through the Arabic tradition, but it is so thinly stretched and entangled with the other threads passing through such early Latin intermediaries as Censorinus, Calcidius, Macrobius, Augustine, Martianus Capella, Boethius, Cassiodorus, and Isidore of Seville that it cannot be clearly traced. Of course, the Islamic world was not concerned with preserving a foreign heritage but rather with transforming all that it assimilated into a new religious, social, and intellectual order. The concerns of the Latin West were rather different.

---

[5] Hieronymus de Moravia, *Tractatus de musica*, ed. S. M. Cserba, Freiburger Studien zur Musikwissenschaft, vol. 2 (Regensburg: Pustet, 1935), 9. There are several Latin "translations" of Al-Fārābī's treatise, but Jerome's version must be based on the version appearing in Vincent of Beauvais's *Speculum doctrinale*, which is shorter than the rest and reads: "Musica comprehendit cognitionem specierum armonie, et illud ex quo componitur et quibus modis" (Music comprises a recognition of the species of harmonia and that from which it is composed and in which manners).

[6] See p. 527 *supra*.

[7] The passages in Magister Lambert's treatise are scattered about, but Farmer (*Al-Fārābī's Arabic-Latin Writings on Music*, 21–31) has arranged them synoptically with the other versions. Farmer's inclusion of the *Quatuor principalia* as an example of the influence of Al-Fārābī seems to stretch the point inasmuch as the relevant passages in *Quatuor principalia* are removed from Al-Fārābī by at least two intermediaries. Randel ("Al-Fārābī and the Role of Arabic Music Theory") offers further comment on the influence of *De scientiis*.

[8] Cf. Aristides Quintilianus *De musica* 1.13.

Latin writers of the first centuries of the Common Era were, on the whole, uninterested in the Greek mathematical and scientific disciplines; they were content to rely on such works as the *Disciplinarum libri IX* of Varro, which treated (in order) grammar, dialectic, rhetoric, geometry, arithmetic, astronomy, music, medicine, and architecture; *De architectura* of Vitruvius; and the *Naturalis historia* of Pliny.[9] Likewise, the writings of Cicero, Seneca, and Quintilianus provided accessible alternatives to Plato and Aristotle, especially in the areas of politics, ethics, and rhetoric. As the Latin West became less bilingual, first-hand knowledge of Greek science and philosophy became less common among its writers.[10]

Writers of this period could, however, make use of Greek mathematical and scientific material in books more suited to their time. The Latin schools needed manuals on the traditional disciplines laid out by Varro and commentaries on complex works of the past, making the material accessible while at the same time perhaps reinterpreting it to accord with such current philosophical or theological movements as neo-Platonism and Christianity.[11] Writers also responded to an interest in magic and the supernatural that developed as individuals reacted to the increasing chaos of their society by losing confidence in the value of work and reason and turning instead to supernatural determinism.[12]

---

[9] The *Disciplinarum libri IX* of Varro (116–27 B.C.E.) survives only in a few passages attributed to Varro by later authors; on Vitruvius, see p. 1 *supra;* the *Naturalis historia* of Pliny (23/24–79 C.E.) was intended to be a comprehensive encyclopedia of human knowledge.

[10] On the decline of Greek in the West, see Pierre Courcelle, *Late Latin Writers and Their Greek Sources,* trans. Harry E. Wedeck (Cambridge: Harvard University Press, 1969), 147–48 and 411–21; see also Marrou, *History of Education in Antiquity,* 259–64.

[11] On Greek commentaries of this same period, see p. 510 *supra.*

[12] For an excellent overview of this background, see R. R. Bolgar, *The Classical Heritage and Its Beneficiaries* (Cambridge: Cambridge University Press, 1954), 13–45; and Marcia L. Colish, *Medieval Foundations of the Western Intellectual Tradition 400–1400,* Yale Intellectual History of the West (New Haven, CT: Yale University Press, 1997), chaps. 1–4. On the difficulty of distinguishing between magic and religion during this period, see Richard Kieckhefer, *Magic in*

Clear distinctions of type did not necessarily exist among these works. A work such as Martianus Capella's *De nuptiis Philologiae et Mercurii* or Censorinus's *De die natali* might fill any number of needs, and works such as Macrobius's *In somnium Scipionis commentarium* might be found in the same library with Augustine's *De musica.*

The treatise of Censorinus (fl. third century C.E.), a Roman grammarian and philosopher, provides a particularly good example of the eclecticism and varied aims of these works. *De die natali,* on birthday lore and other subjects, was composed for the forty-ninth birthday of Censorinus's patron, Qu. Caerellius, in 238.[13] The author states that he based his treatise on earlier commentaries, and inasmuch as Varro is the author most frequently cited by Censorinus, the lost work of Varro is commonly assumed to be the source for much of *De die natali.* It is not impossible, however, that Censorinus also had direct knowledge of some of the works by the more than one hundred authors to whom he refers, including Anaxagoras, Aristotle, Aristoxenus, Epicurus, Eratosthenes, Heracleitus, Hippocrates, Parmenides, Philolaus, Plato, Pythagoras, and Theophrastus.

By tradition, the treatise is arranged into twenty-four "sections," but in stylistic terms, it is written as a single concise exposition on the measures and cycles of time as manifested in days, months, years, periods of gestation, and the ages and durations of life. According to Censorinus, these measures and cycles are clearly exhibited in number, planetary motions, and the zodiac. In section 10, Censorinus seeks to clarify them by briefly commenting on "the rules of music and particularly those that have been

---

the Middle Ages, Cambridge Medieval Textbooks (Cambridge: Cambridge University Press, 1989), 36–42.

[13] According to Cassiodorus *Institutiones* 2.5.10 and Priscian *Institutiones grammaticae* 1.16–17; 14.6, 40–41, Censorinus also composed treatises on grammar and accents. These works seem not to have survived, although some portions may appear in the so-called *Fragmentum Censorini,* which were transmitted along with *De die natali* in manuscripts and early editions until Louis Carrion separated and reorganized them in his edition of 1583 (*Censorinus de die natali. Nova editio Lud. Carrione recensente, augente et pristino ordini suo restituente. Eiusdem argumenti fragmentum incerti scriptoris antea cum eodem Censorini de die natali libro continenter impressum, nunc vero ab eodem Lud. Carrione separatum, correctiusque et capitibus aliquot ex veteri libro additis auctius editum* [Lutetiae, Aegidius Beysius, 1583]).

ignored by musicians themselves."[14] Most of the definitions of this chapter are in fact common in earlier sources, but the definition of music itself, "musica est scientia bene modulandi," is particularly noteworthy because it also appears in Augustine's *De musica* 1.2, Martianus Capella's *De nuptiis Philologiae et Mercurii* 9.930, Cassiodorus's *Institutiones* 2.5.1 (where it appears in close proximity to a reference to Censorinus), and Isidore of Seville's *Etymologiae* 3.15. Definitions of pitch, interval, consonance, and the three primary consonant ratios (4:3, 3:2, and 2:1) measured in both Aristoxenian and Pythagorean terms lead to a review of the discovery of the Pythagorean *harmonia* (6:8:9:12),[15] which is employed in section 11 to explain why seven and ten months were thought to be the normal periods for human gestation.[16]

Section 12 briefly reviews the common associations of music with the gods and humankind, including the influence of music on the human body and soul, while section 13 describes the intervals between the planets and the musical ratios discerned in the Greek planetary system.[17] Although Censorinus is a bit vague in his attribution of the material of section 13, the pattern he describes is identical to the scale attributed to Alexander of Aetolia by Theon of Smyrna.[18] At the end of section 13, observing that the charms of music have delayed him in his discourse, Censorinus states that even an entire book could not exhaust the subject, and the balance of *De die natali* makes no further reference to music.

The *Fragmentum Censorini*, traditionally arranged in fifteen sections, lists the names of various famous melic poets and later musicians (section 9); provides a useful summary of Latin rhythmics and metrics, with examples (sections 10 and 13–15); and lists and briefly defines such traditional divisions of music as *harmonica, organica, rhythmica,* and *crusmatica;* thirteen of the tonoi, matching the pattern described by Cleonides (cf. figure 56 [p. 386 *supra*]) but without the specific names for each of the high and low tonoi; the Greek note names; and terms such as *modus, carmen, tempus,* and *modulatio* (sections 11–12). A brief comment on the development of the kithara by Apollo, Terpander, and Timotheus is included in section 12 (a similar treatment appears in Boethius's *De institutione musica* 1.20).[19]

---

[14] "aliqua de musicae regulis huic loco necessaria dicentur, eo quidem magis, quod ea dicam, quae ipsis musicis ignota sunt" (Nicolaus Sallmann, ed., *Censorini de die natali liber ad Q. Caerellium* [Leipzig: B. G. Teubner, 1983], 15.20–22).

[15] See pp. 362–63, 400–401, 411, 455, and 556–60 *supra.*

[16] Cf. Aristotle *Historia animalium* 7.3–4; Aristides Quintilianus draws similar associations in *De musica* 3.18 (see pp. 426 and 568 *supra*).

[17] In sections 12–13, Censorinus cites as his authorities Socrates, Aristoxenus, Theophrastus, Epicurus, Asclepiades, Herophilus, Pythagoras, Eratosthenes, and Dorylaus. Sallmann (pp. 21–22) provides an extensive list of *loci paralleli.*

[18] See p. 428 *supra.*

All this material is presented in a cursory fashion, without any explanation and in most cases out of its original context and lacking many of the original details. Here, the theoretical materials are merely an intellectual adornment, devoid of any real content.

A little more than a century later, Calcidius (fl. fourth or early fifth century C.E.) completed his translation of Plato's *Timaeus* (only to 53c) with accompanying commentary.[20] Within the tradition of Christian neo-Platonism, Calcidius's commentary made the *Timaeus* generally but imperfectly available to the Middle Ages, although it does not seem to have been known to Macrobius or Isidore of Seville. The commentary is largely derivative, but in his treatment of *Timaeus* 35b, Calcidius departs from tradition in asserting that geometry rather than harmonics holds the fundamental position and is a substructure for the others.[21] Several short chapters (40–55; pertaining to *Timaeus* 36a–37a) are devoted to Platonic music theory and the World-Soul, at least part of which would seem to have been derived either from Theon of Smyrna or directly from Theon's source, Adrastus.[22] The chapters explain the Pythagorean harmonia (6:8:9:12) as it emerges from the duple and triple proportions described by Plato;[23] the story of Pythagoras's discovery of the consonant numbers by suspending weights from strings (paralleling the version in section 10 of Censorinus's *De die natali*), rather than through the more familiar myth of the hammers;[24] the harmonic, arithmetic and geometric means;[25] and the typical numerical characterizations of the fourth, fifth, octave, octave-and-a-fourth, octave-and-a-fifth, double octave, the tone, and the leimma. Calcidius, like Gaudentius and Theon, considers the eleventh a consonance;[26] this is unusual in a treatise within the neo-Platonic tradition. Having reviewed some of the technicalities of Pythagorean mathematics, Calcidius then comments on Plato's famous image of the two revolving circles of the cosmos and the duality of essence, the Same and the Other, a subject also related to music by Aristides Quintilianus in *De musica* 3.24.[27] By interpreting Plato's creation of the World-Soul in Christian terms, Calcidius attempts to show points of agreement between the Platonic and Christian views of the compound nature of the human being. In the section on the use of sight and hearing (section 267), with reference to *Timaeus* 47d, Calcidius makes explicit the importance of music: "Without doubt music rationally adorns the soul, recalling it to its old nature, eventually making it as God the creator made it in the beginning."[28]

---

[19] Here again, Sallmann (pp. 71–86) provides an extensive list of *loci paralleli.* For a review of the Pythagorean elements in Censorinus, see Barbera, "Pythagorean Mathematics," 257–63.

[20] His work is dedicated to Hosius, long thought to be the bishop of Corduba (d. 358), but it is also possible that the dedication actually refers to a Milanese official of ca. 395 and that Calcidius was a Christian neo-Platonist active in Milan whose writings were known to St. Ambrose (see Pierre Courcelle, "Ambroise de Milan et Calcidius," in *Romanitas et Christianitas: Studia Iano Henrino Waszink A. D. Vi Kal. Nov. A. MCMLXXIII XIII lustra complenti oblata,* ed. Willem den Boer et al. [Amsterdam: North-Holland, 1973], 45–53).

[21] "geometrica vicem obtinet fundamentorum, ceterae vero substructionis" (Ioh. Wrobel, ed., *Platonis Timaeus interprete Chalcidio cum eiusdem commentario* [Leipzig: B. G. Teubner, 1876], 97.9–10).

[22] See pp. 417–20 *supra.*

A similar type of commentary, perhaps written only slightly later than Calcidius's, is Macrobius Ambrosius Theodosius's *In somnium Scipionis commentarium*. The author, long thought to have been the prefect in Spain (399–400 C.E.) or the proconsul in Africa (410 C.E.) cited in the Codex Theodosius, was actually praetorian prefect in Italy in 430.[29] In addition to his commentary, he authored *De verborum Graeci et Latini differentiis vel societatibus*, a treatise comparing Greek and Latin verbs, and a *Saturnalia*. Both the commentary and the *Saturnalia* were dedicated to his son, Fl. Macrobius Plotinus Eustathius, city prefect ca. 461.

---

[23] See pp. 363, 399–401, 411, 455, 503–4, and 556–60 *supra*.

[24] See pp. 399 and 503 *supra*.

[25] See also pp. 362–63, 400–401, 422, and 426–27 *supra*.

[26] See pp. 417–19 and 503 *supra*.

[27] See pp. 574–76 *supra*.

[28] "Procul dubio musica exornat animam rationabiliter ad antiquam naturam revocans et efficiens talem demum, qualem initio deus opifex eam fecerat" (Wrobel 298.22–24). For a review of the Pythagorean elements in Calcidius, see Barbera, "Pythagorean Mathematics," 273–76.

[29] Averil Cameron, "The Date and Identity of Macrobius," *Journal of Roman Studies* 56 (1966): 25–38.

Cicero's "Somnium Scipionis,"[30] with its dramatic language, images of the harmony of the spheres, and observations about the nature and ascent of the soul, provided Macrobius with an ideal basis for commentary on such subjects as the classification of dreams, Pythagoras's discovery of musical consonance and Pythagorean number-theory, the nature of virtue, distinctions between mortality and immortality, the neo-Platonic hypostases, movements of the celestial and planetary spheres and their harmonious sound, and the superiority of Plato's view of the soul over Aristotle's. Book I, section 6, and Book II, sections 1–4, of the commentary were particularly central to the medieval understanding of Pythagorean musical mathematics.[31] The *Saturnalia*, with its emphasis on Virgil, rhetoric, poetics, and such lighter topics as food and drink, did not particularly suit medieval readers but became far more popular in the Renaissance.[32]

The commentaries of Calcidius and Macrobius were widely read in the Middle Ages, but Calcidius's commentary seems to have had a more direct influence on later Latin music theory: it is cited in glosses to Martianus Capella's *De nuptiis Philologiae et Mercurii* attributed to John Scotus Erigena and Remy of Auxerre, both the *Musica* and *Scholica enchiriadis* borrow from it,[33] and Calcidius is still occasionally cited by later musical writers such as Bernelinus, Engelbert of Admont, Jacques de Liège, and Franchino Gaffurio. By contrast, the earliest detected instance of a borrowing from Macrobius in Latin music theory is a passage from Regino of Prüm's *Epistola*.[34]

---

[30] The "Somnium Scipionis," which originally formed the close of Cicero's *De re publica*, was the only part of *De re publica* known in the Middle Ages. Cicero modeled the "Somnium Scipionis" on Plato's Myth of Er, which closes his *Respublica*. For reference to an edition and translation of Cicero's *De re publica*, see chapter 2, n. 220 *supra*.

[31] These were most probably derived from Porphyrius's commentaries, especially the commentary on the *Timaeus*, extensive fragments of which still survive. Macrobius does refer (i.19.20) to Ptolemy's *Harmonica*, but this material, too, could have come from Porphyrius's commentary to Book I, chapter 7.

For a full translation of Macrobius's treatise, together with a valuable introduction, see Macrobius, *Commentary on the Dream of Scipio*, trans., with an introduction and notes by William Harris Stahl, Columbia Records of Civilization (New York: Columbia University Press, 1952). For a review of the Pythagorean elements in Macrobius, see Barbera, "Pythagorean Mathematics," 276–81.

[32] Courcelle (*Late Latin Writers*, 13–47) provides a useful overview of Macrobius's use and knowledge of sources in his writings. See also Bolgar, *Classical Heritage*, 43–44.

Augustine's *De musica*, arranged in six books, is quite different in nature from the work of Censorinus, Calcidius, and Macrobius. Like Boethius and Cassiodorus in the following century, Augustine (354–430 C.E.) was concerned at first with preserving and transmitting the heritage of the classical intellectual disciplines arrayed by Varro, and he originally intended to write a treatise on each of them.[35] Nevertheless, it seems only *De grammatica* and *De musica* were completed, and in the case of *De musica*, the original plan was reduced from six books on rhythm and six on melody to five on rhythm and a sixth on musical metaphysics, in which musical number and proportion are seen as worthy of study because they provide a means for discovering the harmonious plan of the Creator within the universe.[36] This shift in focus no doubt reflects Augustine's conversion in 386 to the particular blend of neo-Platonism and Christianity taught by St. Ambrose, the bishop of Milan. In 391, probably the same year in which the sixth book of *De musica* was completed, Augustine became a priest in Hippo (in North Africa), and in 395, he was ordained bishop of Hippo.

---

[33] See Nancy Phillips, "Classical and Late Latin Sources for Ninth-Century Treatises on Music," in *Music Theory and Its Sources: Antiquity and the Middle Ages*, ed. André Barbera (Notre Dame, Indiana: University of Notre Dame Press, 1990), 100–135 (Calcidius is discussed on pp. 126–31, Macrobius on p. 132).

[34] Michael Bernhard, *Studien zur Epistola de armonica institutione des Regino von Prüm*, Bayerische Akademie der Wissenschaften, Veröffentlichungen der Musikhistorischen Kommission, vol. 5 (Munich: Bayerische Akademie der Wissenschaften, 1979), 39–42; see also Phillips, "Classical and Late Latin Sources," 132. Michel Huglo, in his discussion of the use of these texts in medieval universities, notes the relative distribution of medieval manuscripts of these treatises, beginning in the eighth and ninth centuries ("The Study of Ancient Sources of Music Theory in the Medieval Universities," in *Music Theory and Its Sources: Antiquity and the Middle Ages*, ed. André Barbera [Notre Dame, Indiana: University of Notre Dame Press, 1990], 150–72). For translations of relevant passages from Censorinus, Calcidius, and Macrobius, together with a useful commentary, see Joscelyn Godwin, *The Harmony of the Spheres: A Sourcebook of the Pythagorean Tradition in Music* (Rochester, VT: Inner Traditions International, 1993), 40–45 and 60–70.

[35] Augustine *Retractiones* 1.6; and *Epistolae* 101.3.

[36] *De grammatica* (now lost) was completed prior to 387 C.E.; the first five books of *De musica* were probably completed about the same time, while the sixth was probably not written until 391. Because of the ostensible disjunction between the first five books and the sixth, Book VI frequently appeared alone in

The first five books of *De musica* are written in the form of a dialogue between the Magister and the Discipulus, a pattern already anticipated in the treatise of Bacchius Geron[37] and one that periodically recurs in later medieval Latin music theory. In the first book, Augustine develops the greater importance of music rather than grammar in understanding the proper movement of sound in language. Thus, when Augustine defines "music" in chapters 2 and 3 of Book I as "scientia bene modulandi" and "scientia bene movendi," he is clearly grounding his work in the Roman rhetorical tradition rather than in the traditions of Greek music theory. The balance of Book I is then devoted to illustrating basic principles of proportion (following the Pythagorean traditions) and establishing that number provides the basis for a true knowledge of music.[38] While not denying the importance of number in harmonic terms, Augustine's interest (at least at this point) is in the proportions of time,[39] as these are expressed in rhythm and meter. As he takes up his discussion in Book II, he once again makes it clear that in the judgment of verse, the grammarian employs the authority of grammar while the musician (*musicus*) employs reason and sense. Thus, Augustine clearly recognized the primacy of music in defining the rhythm and

---

the manuscript transmission (see Huglo, "Study of Ancient Sources of Music Theory," 170).

[37] See p. 583 *supra*.

[38] Knowledge lacking in theatrical performers ("cantores theatrici"), who might have been particularly supposed in professional terms to be knowledgeable about music (*De musica* 1.6).

[39] "Tempus est autem ad illos motus redire tractandos et discutiendos, qui huic disciplinae proprie tribuuntur, et propter quos ista de numeris, de alia scilicet disciplina, quantum pro negotio satis visum est, consideravimus" (*De musica* 1.23 [*Patrologia cursus completus, series latina*, ed. J. P. Migne, 221 vols. (Paris: Garnier, 1844-1904), 32:1098]; for a somewhat different text [especially in regard to the chapter headings], see Marzi, *Aurelii Augustini de musica* [see chapter 2, n. 43 *supra*]).

meter of verse.[40] Rhythm, meter, and verse, however, are not synonyms for the same thing, and Augustine clarifies all these terms in Book III, as usual with many examples to illustrate the various points. Book IV then provides rather detailed treatments of the various meters and the possibilities for their combination in verse, while Book V describes and illustrates the various types of verse.

The sixth book of *De musica* is wholly different in character and focus. Number and proportion are now expanded from the corporeal to the incorporeal: while the numbers in rhythm—which are found as well in light, color, dance, and celestial harmony—are heard and exist in the memory, they are also eternal. Five genera of number are outlined: in sound (*sonus*), in the sense of hearing (*sensus audientis*),[41] in the act of presentation (*actus pronuntiantis*), in memory (*memoria*), and in discernment (*judicium*). After considering the four virtues (judgment [*prudentia*], discretion [*temperantia*], fortitude [*fortitudo*], and righteousness [*justitia*]),[42] Augustine concludes that while music has a sensuous dimension, when it is organized according to the numerical principles of proportion, it can also stimulate the soul to imitate that harmony and lead it to a love of God.[43] Book VI, as the capstone of *De musica*, certainly suggests parallels with Plato's

---

[40] On this controversial matter, see pp. 40–41 *supra*.

[41] That is, the sense of hearing already has the capacity to comprehend the number in sound even in the absence of sound.

[42] On the four primary virtues, cf. Plato *Euthydemus* 279–281, *Respublica* 4.6–8, and *Leges* 1 (631c–d) and 12 (963a–964b); Plotinus *Enneades* I.2.[19] and I.3.[20]. Cf. also the virtues as articulated by Aristides Quintilianus (pp. 575–77 *supra*).

[43] For a useful survey of Augustine's view of music, extending beyond *De musica*, see Herbert M. Schueller, *The Idea of Music: An Introduction to Musical Aesthetics in Antiquity and the Middle Ages*, Early Drama, Art, and Music Monograph Series, vol. 9 (Kalamazoo: Medieval Institute Publications, Western Michigan University, 1988), 239–56. See also Robert J. Forman, "Augustine's Music: 'Keys' to the *Logos*," in *Augustine on Music: An Interdisciplinary Collection of Essays*, ed. Richard R. La Croix, Studies in the History and Interpretation of Music, vol. 6 (Lewiston, N.Y.: Edwin Mellen Press, 1988), 17–27. For a more general study, see Henri Irénée Marrou, *St. Augustin et la fin de la culture antique*, Bibliothèque des Écoles françaises d'Athènes et de Rome, vol. 145 (Paris: E. de Boccard, 1949).

Timaeus, which Augustine may have known from the partial translation by Cicero.[44]

Augustine's *De musica* preserves a great deal of important material on rhythmics and metrics that complements the surviving treatments of Hephaestion and Aristides Quintilianus, but this does not come from any direct connection with the Greek traditions of music theory. In fact, during the period when he was writing *De musica,* he knew little or no Greek.[45] Augustine was, however, very strongly influenced by the work of Porphyrius, which he read in translation, and Book VI of *De musica* is clearly neo-Platonic in tone and content. Unlike other late Latin writers on music, Augustine's concerns changed in the course of his life—in fact while writing *De musica*—from preserving and transmitting the venerable tradition of the disciplines to defining the important role music could play in the context of a Christian theology adapted from neo-Platonism.[46]

Contemporary with Augustine in North Africa, Martianus Capella[47] provided a fuller treatment of Varro's nine disciplines, which, however, he reduced to the familiar seven by eliminating medicine and architecture. His *De nuptiis Philologiae et Mercurii* became one of the most popular works of the Middle Ages, summarizing the basic material the fifth-century world wanted to preserve from the disciplines.[48] Moreover, the nine books (two on the betrothal and marriage, followed by seven on the disciplines), written in the form of a Menippean Satire in alternating prose and verse, were presented in the form of an elaborate neo-Platonic allegory, with Martianus as a priest telling his son the story of Mercury's search for a bride and Apollo's recommendation of Philology, who is described as:

---

[44] Courcelle, *Late Latin Writers,* 169–70. If Calcidius was in Milan (see n. 20 *supra*) at the time of Augustine's conversion, it is possible Augustine may have been influenced by his commentary on the *Timaeus.* Courcelle, however, rejects (pp. 369–70) this hypothesis, which had been advanced by Marrou, *St. Augustin,* 34, and others.

[45] As Augustine himself states in *Confessiones* 1.13.20 and *Contra academicos* 3.4.7 (Courcelle, *Late Latin Writers,* 153).

[46] For an overview of Augustine's knowledge of Greek and his contact with Greek culture, see Courcelle, *Late Latin Writers,* 149–96. For the influence of Porphyrius on Augustine, see Willy Theiler, *Porphyrios und Augustin,* Schriften der Königsberger Gelehrten Gesellschaft, geisteswissenschaftliche Klasse, vol. 10/1 (Halle: M. Niemeyer, 1933).

[47] Martianus Capella's *floruit* is a matter of some controversy. In the introduction to his two-volume annotated translation, William Harris Stahl concludes that *De nuptiis Philologiae et Mercurii* must have been written between 410 and 439 C.E. (with the later date more likely), adding "To assign the work to a date after 439 calls for extravagant assumptions ..." (William Harris Stahl, with Richard Johnson and E. L. Burge, *Martianus Capella and the Seven Liberal Arts,* 2 vols., Records of Civilization: Sources and Studies, no. 84 [New York: Columbia University Press, 1971–77], 1:15). Nevertheless, Danuta R. Shanzer ("Martianus Minneus Felix Capella," in *OCD,* 932–33) proposes that the work was not written till the last quarter of the fifth century.

> highly educated and well acquainted with Parnassus; upon her the constellations shine in close proximity; no hidden region can conceal from her the movements of the stars through Tartarus, nor can thunderbolts hide from her the will of Jove: she beholds under the sea the nature of wave-born Nereus. She knows your circuits through the several kingdoms of your brothers: ever watchful, with unsparing toil she penetrates the secrets of knowledge, so that with her patient learning she can anticipate all that is given to the gods to foreknow. Indeed, very often she has rights over us, impelling gods under compulsion to obey her decrees; she knows that what no power of heaven can attempt against Jove's will, she can attain.[49]

Invited to vote on approval of the marriage, a council of the gods offers its enthusiastic endorsement, and Book I draws to a close.

In Book II, Martianus continues with a description of Philology's elaborate preparations for her apotheosis and marriage to Mercury. After a series of calculations on the marriage number and the numbers of Mercury's secret name and her own, she anoits herself with protective ointments and is dressed in special clothing provided by her mother, Phronesis. The nine Muses visit her, each one singing a song of tribute, followed by the four virtues, Philosophy, and the three Graces. After purifying herself of all mortal things, Philology is transfigured through consuming an Orphic egg. Then, crowned with the herb of immortality (the Leucas) and ascending through the spheres, together with her retinue of Muses and other attendants, she encounters all manner of objects, spirits, demigods, gods, and other characters, until at last she arrives at the starry sphere.[50] Here, she prays to the neo-Platonic three hypostases (the One, Mind, and World-Soul), the powers Once and Twice, and the Maiden of the Source, after which she passes into the region beyond the starry sphere and the presence of the gods, their progeny, and the souls of such famous ancients as Linus, Homer, Virgil, Orpheus, Aristoxenus, Plato, Archimedes, Heracleitus, Thales, Democritus, Pythagoras, Aristotle, Epicurus, Zeno, and others.

---

[48] For an informative chart showing the relative distribution of manuscripts of *De nuptiis Philologiae et Mercurii*, Book II of Cassiodorus's *Institutiones*, and Isidore of Seville's *Etymologiae*, see Huglo, "Study of Ancient Sources of Music Theory," 163.

[49] "... doctissima virgo, | conscia Parrhasio cui fulgent sidera coetu, | cui nec Tartareos claustra occultare recessus | nec Iovis arbitrium rutilantia fulmina possunt; | fluctigena spectans qualis sub gurgite Nereus, | quaeque tuos norit fratrum per regna recursus, | pervigil immodico penetrans arcana labore, | quae possit docta totum praevertere cura | quod superis praescire datum. quin crebrius in nos | ius habet illa, deos urgens in iussa coactos; | et quod nulla queat superum temptare potestas, | invito scit posse Iove" (*Martianus Capella*, ed. James Willis [Leipzig: B. G. Teubner, 1983], 10.17–28); translation from Stahl, *Martianus Capella*, 2:14.

The following books describe the tributes paid the wedding couple by each of the disciplines, allegorically personified. The first three, Grammar, Dialectic, and Rhetoric, expound at such length they are eventually interrupted by the gods, who tell them they are exhausting the patience of their listeners. Nevertheless, the display of learning continues, and by the time Geometry has completed her discourse—which contains far more geography than geometry[51]—and Arithmetic has arrived, Pleasure, one of the handmaidens of Venus, whispers to Mercury that he is wrong to postpone the nuptial couch and should terminate this display of learning. Unpersuaded, Mercury tells Pleasure that he will be ready when the time arrives but in the meantime will not give offence by slighting any of the handmaidens.

---

[50] The scale described by Martianus Capella, most probably derived from Pliny *Naturalis historia* 2.84, begins like that of Alexander of Aetolia (described by Theon of Smyrna) and Censorinus (see p. 615 *supra*) but then differs in the intervals placed between the Sun, Mars, Jove, Saturn, and the starry sphere, which together with the intervals between the lower planets produce an overall interval of between six- and seven-and-a-half tones (the text is ambiguous and can be read in various ways). As Martianus Capella states that the full set of intervals traversed by Philology in coming to the starry sphere amounts to six tones, it is likely that the upper intervals have become corrupted in the textual transmission. Cf. Schueller, *Idea of Music,* 261; and Joscelyn Godwin, *Harmonies of Heaven and Earth* (Rochester, VT: Inner Traditions International, 1987), 126, for differing interpretations.

[51] Stahl (*Martianus Capella,* 1:47–48) believes that this material is derived from Books II–VI of Pliny's *Naturalis historia* and Solinus's *Collectanea rerum memorabilium.*

Arithmetic accordingly enters and presents an impressive display of Pythagorean numerology and number theory, doubtless based—directly or indirectly—on Euclid, Nicomachus, and perhaps Theon of Smyrna. Numerous parallels with Macrobius are also apparent, especially as Arithmetic expounds on the mystical properties of each of the numbers from 1 to 10. All the gods, and especially Mercury, were filled with admiration for Arithmetic's display and fell silent. By contrast, when Astronomy completes her display, there is no comment at all from the gods.[52]

At the beginning of Book IX, Venus complains, "will there be no end? Will learned teachers ever thwart conjugal pleasures?"[53] Jupiter discovers that Harmony, Medicine, and Architecture await, as well as the seven prophetic arts. Medicine and Architecture are excluded at once because they deal only with mortal and mundane matter, and when Luna observes that she must soon leave to begin her course through the sky, all the gods agree to conclude with Harmony, who detests "the ever-increasing dullness and spiritlessness of the earthborn, resulting from their lack of skill in melic verse. Having long since taken her departure from earth, Harmony has rejected mortals and their desolated academies."[54]

As she enters, Harmony is described as a sublime figure,

> whose melodious head was adorned with ornaments of glittering gold. Her garment was stiff with incised and laminated gold and it tinkled softly and

---

[52] This may be due, however, to a lacuna in the text. Neverthelss, it is noteworthy that prior to the appearance of Astronomy, Martianus Capella introduces a drunken Silenus, whose belch causes the gods to break their admiring silence with laughter. Martianus is rebuked for this by Satire, who is supposed to have told him the story he is now narrating—and embellishing—for his son. It is not impossible that Martianus is expressing some antipathy to this particular discipline. If so, there is some irony in the fact that this section of the treatise continued to be popular and excerpted long after interest had faded in the other disciplinary sections of *De nuptiis Philologiae et Mercurii* (see Stahl, *Martianus Capella,* 1:70–71). For a fuller discussion of the content and design of Books III–VIII, see ibid., 1:98–201.

[53] "'quis modus' inquit 'erit? quonam sollertia fine | impedient thalamos ludere gymnasia?'" (Willis 337.9–10); translation from Stahl, *Martianus Capella,* 2:345.

[54] "exosa terrigenae stoliditatis ignaviam, quam meliorum indocilis auget sine fine mortalitas. denique iam pridem homines dirutaque gymnasia abscedens orbe terrisque damnavit ..." (Willis 342.17–19); translation from Stahl, *Martianus Capella,* 2:349.

> soothingly with every measured step and movement of her body.... In her right hand Harmony bore what appeared to be a shield, circular overall, with many inner circles, the whole interwoven with remarkable configurations. The encompassing circles of this shield were attuned to each other, and from the circular chords there poured forth a concord of all the modes. From her left hand the maiden held, suspended at equal length, several small models of theatrical instruments, wrought of gold. No lyre or barbiton or tetrachordon appeared on that circular shield, yet the strains coming from that strange rounded form surpassed those of all musical instruments. As soon as she entered the hall, a concord swelled from the shield. All other music—which, by contrast with its sweetness, sounded dissonant—now became silent. Then Jupiter and the other heavenly beings, recognizing the grandeur of the higher melody, which was pouring forth in honor of a certain secret fire and inextinguishable flame, reverenced the profound ancestral song, and one by one arose in homage to extramundane intelligence.[55]

Harmony begins by recounting the beneficial qualities of music and especially its traditional powers to influence the behavior both of mankind and of animals.[56] With this elevating introduction, she then proceeds to recount the principles of harmonics, rhythmics, and metrics, much of which seems to be closely based on the treatise of Aristides Quintilianus, though Martianus Capella never mentions his name.[57] While Martianus Capella may also have borrowed from Aristides Quintilianus the general notion of the modern disregard for music, he does not try to preserve Aristides Quintilianus's subtle definition of music.[58] The earlier treatise simply provides him with a useful quarry of technical information that parallels, at more or less the same level, the technical information provided for the other disciplines. Material that would not have been in keeping with the narrative structure of *De nuptiis Philologiae et Mercurii,* such as the various notational diagrams included in Book I, sections 9 and 11,[59] is omitted.

---

[55] "cuius sonorum caput auri coruscantis bratteis comebatur, caeso etiam tenuatoque metallo rigens vestis, et omnibus ad motum gressumque rata congruentia temperatum blandis leniter crepitaculis tinniebat.... dextra autem quoddam gyris multiplicibus circulatum et miris ductibus intertextum velut clipeum gestitabat, quod quidem suis invicem complexibus modulatum ex illis fidibus circulatis omnium modorum concinentiam personabat. laeva autem virginis quamplures ex auro assimulatae parvaeque effigies theatralium voluptatum religatae aeque pendebant. verum ille orbis non chelys nec barbiton nec tetrachordon apparebat, sed ignota rotunditas omnium melodias transcenderat organorum. denique mox ingressa atque eiusdem orbis sonuere concentus: cuncta illa, quae dissona suavitas commendarat, velut mutescentia tacuerunt, ipseque tunc Iuppiter caelestesque divi superioris melodiae agnita granditate, quae in honorem cuiusdam ignis arcani ac flammae insopibilis fundebatur, reveriti intimum patriumque carmen paululum in venerationem extramundanae omnes intellegentiae surrexerunt" (Willis 347.7–348.2); the translation is lightly adapted from Stahl, *Martianus Capella,* 2:352–53.

[56] The material is probably drawn from Varro, to whom Martianus Capella refers at this point.

[57] On Martianus Capella's borrowings from Aristides Quintilianus, see Hermann Deiters, *Studien zu den griechischen Musikern. Über das Verhältnis des Martianus Capella zu Aristides Quintilianus,* Program des Königlichen Marien-

Harmony first offers some preliminaries, which she says are necessary "in order to make the ensuing discussion more intelligible."[60] After briefly describing the tone, semitone, and various sizes of diesis; naming each of the notes, as well as referring to the common definitions of pitch and the three primary consonant intervals; and mentioning the fifteen *tropoi,* each of which comprises five tetrachords, Harmony moves ahead with a fuller discussion.

To Lasus of Hermione[61] is attributed a three-fold division of harmony, which Martianus Capella gives in Greek: ὑλικόν, ἀπεργαστικόν, and ἐξαγγελτικόν or ἑρμηνευτικόν. While this particular division is not found in the treatise of Aristides Quintilianus, much of the order, structure, and detail of the following sections (937–995) can be traced to his *De musica,* as is illustrated in the following table. Nevertheless, in a number of cases, significant supplemental detail must have been drawn from Cleonides's *Harmonica introductio* (or a similar treatise no longer known today) and perhaps from Aristoxenus himself.

De nuptiis, Book IX, section	*De musica*
937	1.4
938	1.5

Gymnasiums in Posen (Posen: Merzbach, 1881); and Stahl, *Martianus Capella,* 53–54.

[58] See pp. 525–26 *supra.*

[59] See pp. 531–37 *supra.*

[60] "praedicta enim ideo prima dicta sunt ut altius tenerentur" (Willis 360.4–5).

[61] See pp. 74–76 and 303 *supra.*

939	1.14 (cf. Cleonides §2)
940	1.5–6
941–47	1.6 (cf. Cleonides §4)
948–50	1.7 (cf. Cleonides §§5 and 8)
951–54	1.8 (cf. Cleonides §§8–9)
955–59	1.9
960–63	1.10 (cf. Cleonides §9)
964	Cleonides §13 (cf. 1.11)
965–66	1.12
967	Aristoxenus *Elementa rhythmica* 3–6
968–70	1.13 and 23
971–80	1.14
981–84	1.15
985–89	1.16
990–93	1.17
994–95	1.19

As Harmony concludes her discourse, to the delight of all the gods and the wedding couple, Martianus Capella draws his story to a close.

Readers of *De nuptiis Philologiae et Mercurii* would certainly have encountered much more Pythagorean number theory[62] and Aristoxenian music theory than they would have found in any one of the other Latin writers of this time, but the theories emerge as fragments of arcane knowledge, remote from the experience of medieval readers, as Harmony herself declares. No reader could have formed any clear conception of the tradition of Greek music theory from *De nuptiis Philologiae et Mercurii.* Nevertheless, though passing in and out of favor over the centuries, the influence of Martianus Capella's work on the medieval imagination and its conception of the seven liberal arts cannot be overestimated.[63] Works such as this, while demonstrating only a tenuous understanding of the Greek disciplines, were of utmost significance in maintaining the receptiveness to ancient traditions that would eventually lead to the humanistic reconception of ancient Greek music theory.

---

[62] For a review of the Pythagorean elements in Martianus Capella's treatise, see Barbera, "Pythagorean Mathematics," 281–85.

[63] For an interesting comparison of the relative influence of Boethius and Martianus Capella, see Michael Masi, "Boethius and the Iconography of the

The burst of activity at the end of the fourth century and the beginning of the fifth century C.E. came to a close with the fall of Rome in 455 and the end of the empire in 476 when Odoacer (also known as Odovacar) deposed Romulus Augustulus. Odoacer himself was eliminated in 493 by Theoderic, who for the next thirty-three years ruled over the Western regions as King of the Ostrogoths. Educated in Constantinople, Theoderic prized Greek culture as well as valuing the administrative abilities and traditions of the Roman senatorial class, from which Anicius Manlius Severinus Boethius (ca. 480–525/26 C.E.) descended.[64]

Boethius was raised by the powerful senator Q. Aurelius Memmius Symmachus, who eventually became his father-in-law and for whom he held life-long admiration and respect. Unlike his predecessors among the other Latin writers who had turned their attention to music, Boethius was fully bilingual and had studied Plato, Aristotle, commentaries, and Greek scientific works that formed a part of the academic program of the neo-Platonic schools of Athens and Alexandria.[65] Boethius feared that this knowledge would be lost in the decline of civilization he and Symmachus perceived. In a letter to Symmachus and in his commentaries, Boethius states his intention to prepare paraphrase translations of the major Greek scientific works on arithmetic, music, geometry, and astronomy (which he calls the *quadrivium* in his work on arithmetic [*De institutione arithmetica* 1.1]); all of Aristotle's work on logic, ethics, and physics, together with commentaries; and all of Plato, again with commentary. Finally, he will show the inherent harmony of the two philosophical

---

Liberal Arts," *Latomus: Revue d'études latines* 33 (1974): 57–75 and plates VII–XV.

[64] For an excellent survey of Roman and Gothic politics, and Boethius's life as viewed against that background, see Henry Chadwick, *Boethius: The Consolations of Music, Logic, Theology, and Philosophy* (Oxford: Clarendon Press, 1981).

[65] Courcelle (*Late Latin Writers*, 273–318) thinks that Boethius studied with Ammonius in Alexandria but acknowledges that the assumption cannot be proven (Chadwick [*Boethius*, 20] agrees).

schools.[66] Boethius was not able to carry out this astonishing program, but his surviving work includes a commentary on Cicero's *Topica,* translations (in some cases with commentary) of Porphyrius's *Isagoge* and Aristotle's *Topica, Analytica priora, Categoriae, Sophistici elenchi,* and *De interpretatione,* an introduction to Peripatetic logic, various theological works, the famous *De consolatione philosophiae* (which recalls Martianus Capella's work in its alternating structure of prose and verse), his work on arithmetic, and a substantial portion of his work on music.

Boethius's *De institutione musica* is unquestionably one of the great monuments of medieval music theory, and its influence, especially from the ninth century forward,[67] can hardly be overestimated. It is by far the most substantial early medieval work in Latin devoted entirely to music, and its technical content conveyed a much fuller view of the traditions of Greek music theory than the works of Censorinus, Calcidius, Macrobius, or Martianus Capella.

As Calvin M. Bower has demonstrated, *De institutione musica* was typical of Boethius's other early works (such as *De institutione arithmetica* and the works on logic) in being a kind of "translation," but for Boethius, the process of translation meant absorbing the earlier author's work, along with the glosses and marginalia found in his sources, and then "turning it into the Roman style."[68] For the first four books of *De institutione musica,*

---

[66] Courcelle, *Late Latin Writers,* 276–77. For a consideration of the intellectual program envisioned by Symmachus and Boethius, see ibid., 322–30.

[67] See Huglo, "Study of Ancient Sources of Music Theory," 171–72. Among the most important studies of Boethius's *De institutione musica* should be included Calvin Bower's annotated translation (see chapter 2, n. 84 *supra*); *Boethius. Fünf Bücher über die Musik,* aus der lateinischen in die deutsche Sprache übertragen und mit besonderer Berücksichtigung der griechischen Harmonik, sachlich erklärt von Oscar Paul (Leipzig: F. E. C. Leuckart, 1872; reprint, Hildesheim: G. Olms, 1973); Leo Schrade, "Music in the Philosophy of Boethius," *Musical Quarterly* 33 (1947): 188–200; James Haar, "Musica Mundana: Variations on a Pythagorean Theme" (Ph.D. dissertation, Harvard, 1960); Henri Potiron, *Boèce: Théoricien de la musique grecque* (Paris: Bloud & Gay, 1961); Ubaldo Pizzani, "Studi sulle fonti del 'De Institutione Musica' di Boezio," *Sacris erudiri* 16 (1965): 5–164; and Chadwick, *Boethius,* 78–101.

[68] "in Romanum stilum vertens" (*Anicii Manlii Severini Boetii Commentarii in Librum Aristotelis Perihermeneias editio secunda, seu maiora commentaria,* ed. Karl Meiser, 2 vols. [Leipzig: B. G. Teubner, 1877–80], 2:79).

Boethius probably drew on the longer but now-lost work on music promised by Nicomachus in his surviving *Manuale harmonices*.[69] The fifth book, which breaks off in section 19, is manifestly based on Book I of Ptolemy's *Harmonica*, and it is quite likely that *De institutione musica* originally had—or was intended to have—two further books corresponding to Books II and III of Ptolemy's treatise.[70]

Book I of *De institutione musica* presents an introduction to the study of music as it would have been understood by the Pythagoreans, framed by two of the most famous and influential formulations associated with Boethius: at the beginning (section 2), the three-fold division of *musica* into *mundana, humana,* and *instrumentalis;* and at the end (section 34), the distinction between those who make music—instrumentalists and poets—and the true *musicus,* "one who exhibits the faculty of forming judgments according to speculation or reason relative and appropriate to music concerning modes and rhythms, the genera of songs, consonances, and all the things which are to be explained subsequently, as well as concerning the songs of the poets."[71] This latter formulation is, of course, intended to prepare the reader for the detailed technical demonstrations of the following books, while the first formulation appears in the context of preliminary philosophical and historical observations about the power and utility of music, leading Boethius to conclude:

> From these accounts it appears beyond doubt that music is so naturally united with us that we cannot be free from it even if we so desired. For this reason the power of the intellect ought to be summoned, so that this art, innate through nature, may also be mastered, comprehended through knowledge. For just as in seeing it does not suffice for the learned to perceive colors and forms without also searching out their properties, so it does not

---

[69] See p. 392 *supra.*

[70] Boethius, *Fundamentals of Music,* xxiv–xxix and xxxviii. For a fuller examination of Nicomachus as a source for *De institutione musica,* see Bower, "Boethius and Nicomachus," *passim,* which builds and expands upon the earlier work of Pizzani, "Studi sulle fonti."

[71] "isque est musicus, cui adest facultas secundum speculationem rationemve propositam ac musicae convenientem de modis ac rythmis deque generibus cantilenarum ac de permixtionibus ac de omnibus, de quibus posterius explicandum est, ac de poetarum carminibus iudicandi" (*Boethii De institutione musica libri quinque,* ed. Godofredus Friedlein [Leipzig: B. G. Teubner, 1867], 225; translation from Boethius, *Fundamentals of Music,* 51).

suffice for musicians to find pleasure in melodies without also coming to know how they are structured internally by means of ratio of pitches.[72]

Between these two formulations, basic Pythagorean tenets are arrayed in six general sections concerning sound as quantity and ratio (sections 3–8); reason, the senses, and Pythagoras's discovery of harmonic principles (sections 9–11); the nature of the voice and hearing (sections 12–14); the theory of intervals (sections 16–19); the names, functions, and inventors of the various notes, their arrangement into tetrachords, genera, and scales, and their association with the various planetary orbits (sections 20–27); and the nature of consonance.[73] Nearly all the concepts in these sections echo surviving Greek sources, with the exception of the discussion of the "inventors" of the various notes (in section 20), which has no parallel in any surviving earlier source. Moreover, the material is presented in such a way that the reader can actually form a reasonably coherent view of basic Pythagorean music theory, especially as it was absorbed by incipient neo-Platonic writers such as Nicomachus.

Books II and III set out in mathematical terms, with regular reference to Boethius's *De institutione arithmetica* (a translation of Nicomachus's *Introductio arithmetica*), demonstrations of the various Pythagorean tenets presented in Book I. Book II begins with a brief introduction explaining that Pythagoras defined philosophy as the study of "whatever may properly and truly be said 'to be,'" that is, "forms, magnitudes, qualities, relations, and other things which, considered in themselves, are immutable, but which, joined to material substances, suffer radical change and are altered in many ways because of their relationship with a change-able thing."[74] Quantity is either continuous, in which case it is magnitude, or discrete, in which case it is multitude; each of these has both finite and infinite characteristics. Each of the four mathematical disciplines deals with a certain type of quantity: geometry with fixed magnitude, astronomy with movable magnitude, arithmetic with discrete quantity, and music with quantities in relation to other quantities. With this introduction, Boethius is ready to explore the theory of ratios (sections 4–11), the arithmetic, geometric, and harmonic means (sections 12–17),[75] the theory of consonance (sections 18–20), and the identification of the various ratios with their respective consonances (sections 21–31).[76] Book III then treats the smaller intervals, beginning (sections 1–4) with the characteristic Pythagorean proofs that the tone cannot be divided into two equal parts. Here again, this material parallels quite closely the Pythagorean material found in the *Sectio canonis* and the treatises of Nicomachus and Theon of Smyrna. Nevertheless, a few features are unusual: the discussion of the apotome (Book III, section 5) has only one earlier Greek parallel in the treatise of Gaudentius, while the definitions of the comma, schisma, and diaschisma (Book III, section 8), attributed to Philolaus, do not appear in any earlier surviving Greek sources.[77]

---

[72] "ut ex his omnibus perspicue nec dubitanter appareat, ita nobis musicam naturaliter esse coniunctam, ut ea ne si velimus quidem carere possimus. Quocirca intendenda vis mentis est, ut id, quod natura est insitum, scientia quoque possit conprehensum teneri. Sicut enim in visu quoque non sufficit eruditis colores formasque conspicere, nisi etiam quae sit horum proprietas investigaverint, sic non sufficit cantilenis musicis delectari, nisi etiam quali inter seconiunctae sint vocum proportione discatur" (Friedlein 187; translation from Boethius, *Fundamentals of Music,* 8). This chapter also includes the famous Spartan decree condemning Timotheus of Miletus, preserved only in the treatise of Boethius (see pp. 67–68 *supra*).

[73] Possible sources and *loci paralleli* for all this material are provided in Bower's annotations (Boethius, *Fundamentals of Music,* 1–51).

Book IV centers around several divisions of the monochord, the subject "toward which our whole effort has been directed,"[78] which are used to develop a theory of modes. The first two sections provide a Latin version of the prologue and first nine propositions of the *Sectio canonis*, which constitute the mathematical portion of the *Sectio canonis* preceding the specifically musical corollaries and the monochord division itself.[79] Either Boethius (or his source) did not know or have access to the *Sectio canonis* as it has been transmitted in its fuller Greek versions or he decided to conflate the mathematical portion with a discussion of notation (in sections 3–4)[80] and a series of divisions arranged by tetrachord in each of the three genera (sections 5–12), an arrangement quite distinct from the monochord divisions in the Greek tradition. It is possible, however, to see these divisions as precisely the type of division Nicomachus in his *Manuale harmonices* promised to provide in his later, longer work.[81]

---

[74] "quae proprie vereque esse diceretur ... Haec autem esse formas magnitudines qualitates habitudines ceteraque quae per se speculata inmutabilia sunt, iuncta vero corporibus permutantur et multimodis variationibus mutabilis rei cognatione vertuntur" (Friedlein 227–28; translation from Boethius, *Fundamentals of Music*, 52–53).

[75] See pp. 362–63, 400–401, 422, and 426–27 *supra*.

[76] At this point, Boethius excludes the octave-and-a-fourth as a consonance, even though he is clearly aware that other theorists, and Ptolemy in particular, have allowed it. In Book V, sections 9–10 (which are based on Ptolemy's *Harmonica*), the octave-and-a-fourth is accepted as a consonance. On this matter, see pp. 325, 379, 417–19, 439–41 and 503 *supra*.

[77] The most detailed discussion of the mathematics in Books I–III is provided by Barbera, "Pythagorean Mathematics," 200–237.

[78] "quo tota tendit intentio" (Friedlein 301).

Following a brief consideration of the differences between the fixed and movable pitches (section 13), Book IV turns to a description (sections 14–17) of the species of the fourth, fifth, and octave, from which are derived eight "modes, which are also called 'tropes' or 'tones.'"[82] While these ostensibly match the eight tonoi identified by Ptolemy, they are displayed in a "wing diagram" reminiscent of the one described by Aristides Quintilianus, a unique arrangement quite foreign to Ptolemy's concept of a characteristic octave.[83] The Book then closes (section 18) with an explanation of a simple method for demonstrating the three primary consonances on a monochord. This section recalls Ptolemy's *Harmonica* (1.8), although the correspondence is not exact.

At the beginning of Book V, Boethius provides a brief transition in which he notes that attention must be paid to differences of opinion among ancient musicians and that certain advantages are to be found in studying the ratios on an instrument of eight strings rather than one. With these few words, he sets up the beginning of his adaptation of Book I of Ptolemy's *Harmonica*, which concentrates on these very topics.[84] In sections 2–3, Boethius summarizes Ptolemy's belief that a blend of the Pythagorean emphasis on reason with the Aristoxenian reliance on the senses will lead to more accurate musical judgments. In sections 4–12, he reviews the Pythagorean method of determining the rational basis of musical sounds and intervals, rejects the method as unnecessarily limiting, and supplies his own rational basis for the classification of intervals. In sections 13–18, he turns his attention to Aristoxenus and Archytas, whose methods and tetrachordal divisions are criticized as a preparation for Ptolemy's presentation of his own improved divisions, which begins in section 19, just before Book V is abruptly truncated.[85]

---

[79] André Barbera (*Division of the Canon*) has provided a detailed study of this treatise, including consideration of the relationship of the Latin to the two Greek versions. See pp. 345–48 *supra* and Barbera, "Pythagorean Mathematics," 237–42.

[80] The sections on notation exhibit some parallels with the treatise of Gaudentius, which according to Cassiodorus existed in a translation by Mutianus (see pp. 499 *supra* and 637 *infra*). Bower ("Boethius and Nicomachus," 14–19) thinks these cannot have been drawn from Gaudentius because Boethius begins with the Lydian mode and includes all twenty-eight signs while Gaudentius begins with the Hypolydian and includes only eighteen. It is probable, however, that in its original form, Gaudentius's treatise did include a full description of each note-shape and a table for the Lydian mode (see pp. 507–9 *supra*).

[81] See pp. 403–6 *supra*.

[82] "modi, quos eosdem tropos vel tonos nominant" (Friedlein 341).

[83] As Bower has observed ("Boethius and Nicomachus," 35–37). See also pp. 463–65 *supra*.

At the beginning of Book I, Boethius proposed a fuller discussion of *musica humana* and *musica mundana*, but these two subjects never return in the extant text. If the remaining two books of Ptolemy's *Harmonica* had been included as Books VI and VII of *De institutione musica*, with Boethius's normal adaptation, they could perhaps have fulfilled the promise of Book I.[86]

Boethius's *De institutione musica* may be viewed as preserving more or less in full the longer treatise Nicomachus promised to write, constituting both a Pythagorean treatise of singular importance and, together with the *Harmonica* of Ptolemy, one of the two major treatises between the time of Aristoxenus and the authors of late antiquity.[87] In addition, it also represents the last attempt of any Latin writer until the Renaissance to compose anything like a comprehensive treatment of ancient Greek music theory. As John Caldwell writes:

---

[84] See pp. 436–51 *supra*.

[85] Cf. pp. 439–47 *supra* for a description of the comparable sections in Ptolemy's *Harmonica*. As the titles for sections 19–30 remain at the beginning of Boethius's Book V, it is possible from these to see that the remainder of Book V would have followed the balance of Book I of Ptolemy's *Harmonica*.

[86] This assumes, of course, that Ptolemy actually completed Book III of the *Harmonica*. On this matter and the content of Books II and III of the *Harmonica*, see pp. 451–94 *supra*.

[87] Bower, "Boethius and Nicomachus," 41.

> [*De institutione musica*] is a difficult book today, and it will have been difficult in the early years of the sixth century. The educational system of the ancient world was still nominally intact, but contemporary readership of this book can only have been small. By one of those curious accidents of history it was to be of the most profound significance in the development of Western musical thought from Carolingian times on; and that is the real importance of Boethius for musical history.[88]

Boethius's successor as *Magister officiorum* in the service of Theoderic, Flavius Magnus Aurelius Cassiodorus (ca. 490–585 C.E.) shared his concern for the preservation of the Greek traditions of learning, but Cassiodorus did not attempt to match or continue Boethius's program of individual translation. Rather, he seems to have realized that these traditions could only be preserved within some sort of larger institution or community. He accordingly founded with Pope Agapetus a Christian university in Rome in 535, but it did not survive the continuing conflicts of the next eighteen years, during which Rome passed back and forth between the Byzantine generals and the Ostrogoth rulers. After serving for a time in Constantinople, perhaps between 540 and 550, Cassiodorus returned to his ancestral estates in Calabria, where he established a new monastery, Vivarium, which would follow not the Benedictine Rule but rather a special cultural, intellectual, and educational rule in which reading and copying were central to monastic life. This Rule was defined in particular by the *Institutiones divinarum et saecularium litterarum*, a short bibliographic encyclopedia of Christian and secular studies, intended to provide the basis for Christian higher education. Although Vivarium did not long survive the death of its founder, it was of great importance in preserving ancient and early Christian literature and it established a tradition of wide monastic learning that eventually influenced other monastic orders.[89]

The *Institutiones* is divided into two books, the first dealing primarily with exegesis of scripture; the councils of Nicaea, Constantinople, Ephesus, and Chalcedon; early Christian history; the lives of several of the most important early saints and abbots; advice for the study of scripture; and the care and organization of the monastery itself. In the second book, Cassiodorus draws a distinction between the three preliminary arts (*artes*)—arranged in the order grammar, rhetoric, and dialectic—and the four mathematic sciences, in the order arithmetic, music, geometry, and astronomy. On the surface, the structure of the second book of the *Institutiones* may suggest some resemblance to Martianus Capella's *De nuptiis Philologiae et Mercurii*, but the *Institutiones* is free of literary pretensions and seeks to provide only the most basic summary and bibliography for the disciplines.

---

[88] John Caldwell, "The *De Institutione Arithmetica* and the *De Institutione Musica*," in *Boethius: His Life, Thought and Influence*, ed. Margaret Gibson (Oxford: Blackwell, 1981), 143.

[89] For a fuller study of Vivarium, its influence, and the date of its manuscripts, see Courcelle, *Late Latin Writers*, 331–409.

Cassiodorus's treatment of music is brief, but even at that, it is still considerably longer than his treatments of geometry and astronomy. His point of departure is the treatise of Gaudentius, which he tells his readers has been translated into Latin by "Mutianus, a man of great eloquence" (*vir disertissimus Mutianus*). At the end of the section on music, Cassiodorus once again recommends the treatise of Gaudentius to his followers, for if they "read it with close attention, it will open to you the courts of this science."[90] He also regards Censorinus as a musical authority and has insured that the monastery possesses a copy (*transscriptum*) of his work.[91] Cassiodorus observes that Gaudentius identifies Pythagoras as the discoverer of the beginnings of music, while Clement of Alexandria attributes the origin of music to the Muses. For his own part, Cassiodorus remarks on the close connection between religion and music, observing that music is present in all proper actions of life:

> First, it is true that if we perform the commandments of the Creator and with pure minds obey the rules he has laid down, then every word we speak, every pulsation of our veins, is related by musical rhythms to the powers of harmony. Music indeed is the knowledge of proper measurement. If we live virtuously, we are constantly proved to be under its discipline, but when we commit injustice we are without music. The heavens and the earth, indeed all things in them which are directed by a higher power, share in this dis-

---

[90] "quem si sollicita intentione relegatis, huius scientiae vobis atria patefaciet" (Mynors 149.17–19). Translation from "Cassiodorus, from *Fundamentals of Sacred and Secular Learning,*" in *Strunk's Source Readings in Music History,* vol. 2, *The Early Christian Period and the Latin Middle Ages,* ed. James McKinnon (New York: Norton, 1998), 36.

[91] In his reference to the copy of Censorinus's treatise, it is not entirely clear whether Cassiodorus is referring to *De die natali* or to a separate work *De accentibus*—or indeed whether he knew of these as two separate works. See pp. 614–16 (and especially n. 13) *supra.*

> cipline of music, for Pythagoras shows that this universe was founded by and can be governed by music.[92]

Cassiodorus does not identify the source of these definitions, but they certainly recall the broad neo-Platonic view presented by Aristides Quintilianus in Book II of *De musica*[93] and, especially in the definition of music as the knowledge of "proper measurement," Censorinus's *De die natali*.[94]

From this general introduction, Cassiodorus turns abruptly to technical definitions: music is the discipline that treats the relationships of number in sound; music encompasses the three subject of harmonics, rhythmics, and metrics; and musical instruments can be classified as string, wind, or percussion. These are hardly unfamiliar definitions, but it is not clear whether Cassiodorus has derived them from a variety of sources or a single source.[95]

When he turns his attention to the consonances and the fifteen tonoi, which occupy most of the balance of the section on music, Cassiodorus is clearly drawing from Gaudentius and perhaps another author. Cassiodorus's definitions of the six consonances and their ratios match those provided by Gaudentius,[96] but in his definition of the consonance of the octave, he adds that this consonance is "also called diocto," a special term found only infrequently in the Greek sources: in Aristides Quintilianus's *De musica* 1.8, Ptolemy's *Harmonica* 3.1, and the Aristotelian *Prob-*

---

[92] "primum, si Creatoris mandata faciamus et puris mentibus statutis ab eo regulis serviamus. quicquid enim loquimur vel intrinsecus venarum pulsibus commovemur, per musicos rithmos armoniae virtutibus probatur esse sociatum. musica quippe est scientia bene modulandi; quod si nos bona conversatione tractemus, tali disciplinae probamur semper esse sociati. quando vero iniquitates gerimus, musicam non habemus. caelum quoque et terra, vel omnia quae in eis dispensatione superna peraguntur, non sunt sine musica disciplina; nam Pythagoras hunc mundum per musicam conditum et gubernari posse testatur" (Mynors 143.8–19). Translation from McKinnon, "Cassiodorus," 32.

[93] See pp. 541–42 and 551–54 *supra.*

[94] See p. 615 *supra.*

[95] The three categories of harmonics, rhythmics, and metrics appear at the very beginning of the surviving portion of the treatise of Alypius (see pp. 594–96 *supra*), one of the authorities cited by Cassiodorus at the very end of his section on music. The treatise of Aristides Quintilianus discusses all these subjects, including the various types of instruments, but Cassiodorus does not cite his name.

[96] See p. 503 *supra.*

lemata (19.32). Cassiodorus does cite Ptolemy as an important authority at the end of the section on music, but as Ptolemy rejects the fifteen tonoi, he would not seem a likely source for this term. Moreover, Cassiodorus clearly cites authors he has not read and whose works were not held in the Vivarium library.[97]

Could Cassiodorus have known the Aristotelian *Problemata* or the *De musica* of Aristides Quintilianus? Perhaps. Following his discussion of the consonances, Cassiodorus embarks on a formulaic description of the relationship of the fifteen tonoi. No other theorist describes the position of each tonos in relation both to its neighbor and to every other lower tonos.[98] This prose description, however, could easily have been intended to take the place of the wing diagram presented by Aristides Quintilianus (*De musica* 1.11) or perhaps by Gaudentius, if Cassiodorus possessed a complete copy of his treatise.[99]

Without attempting any explanation of the relationship between the tonoi and the reputed power of music to influence both animals and human character, Cassiodorus recalls the stories of Orpheus and the Sirens, which he dismisses as myth, of David and Saul, and of the physician Asclepiades. The musical cures of Asclepiades are described more fully in Book IX (926) of Martianus Capella's *De nuptiis Philologiae et Mercurii*, but in general, these stories would have been commonly known to anyone of Cassiodorus's background. They provide the basis for Cassiodorus's conclusion: "nothing in things celestial or terrestrial which is fittingly conducted according to the Creator's own plan is found to be exempt from this discipline," which exhibits clear echoes of the proem to Aristides Quintilianus's *De musica*.[100]

---

[97] Courcelle, *Late Latin Writers*, 336. In addition to Gaudentius, Censorinus, and Clement of Alexandria, whose works were almost certainly present in the library at Vivarium, Cassiodorus cites as Greek authorities Alypius, Euclid (perhaps Cleonides?), and Ptolemy, whose works on music were probably not present, and as Latin authorities Albinus, Apuleius of Madaura, and Augustine. It is probable that Vivarium possessed Augustine's *De musica* but not the musical treatises of Albinus and Apuleius (on Albinus and Apuleius, see p. 412 [and n. 110] *supra*).

[98] Cassiodorus's description of the Hyperlydian may serve as an example: "The Hyperlydian, the newest and highest of all, exceeds the Hyperaeolian by a semitone, the Hyperphrygian by a tone, the Hyperiastian by a tone and a half, the Hyperdorian by two tones, the Lydian by two tones and a half, that is, by the consonance diatessaron, the Aeolian by three tones, the Phrygian by three tones and a half, that is, by the consonance diapente, the Iastian by four tones, the Dorian by four tones and a half, the Hypolydian by five tones, the Hypoaeolian by five tones and a half, the Hypophrygian by six tones, that is, by the consonance diapason, the Hypoiastian by six tones and a half, the Hypodorian by seven tones" (translation from McKinnon, "Cassiodorus," 35–36).

[99] On the wing diagram, see pp. 534–36 *supra;* on the incomplete state of Gaudentius's treatise, see pp. 508–9 *supra.*

Cassiodorus's *Institutiones* was widely read in the Middle Ages, but it presented only minimal traces of the tradition of ancient Greek music theory, especially in comparison to Boethius's *De institutione musica*. It did, however, identify the names of a number of important musical authorities, and Cassiodorus's own authority insured its influence on later medieval music theory. The particular array of consonances (including the octave-and-a-fourth) and tonoi in the *Institutiones*, distinct from that provided by Boethius, added to the increasingly muddled picture presented by the later writers.[101]

With Isidore (ca. 560/564–636), Bishop of Seville, the lineage of early medieval Latin writers with first-hand knowledge of the Greek tradition of music theory comes to an end. Indeed, his *Etymologiae*, an "encyclopedia" of knowledge of late antiquity, completed after Isidore's death and arranged in twenty books by Braulio (Bishop of Saragossa, 631–651), already represents the beginning of the next stage of medieval music theory in the West, a stage in which the theory is no longer directly based on the Greek tradition but rather on earlier sources in Latin. Recent scholarship has demonstrated that Isidore based the section on music in his *Etymologiae* (Book III, chapters 15–23) on an expanded recension of Cassiodorus's *Institutiones* rather than on his own independent study of the Greek sources.[102]

---

[100] "quicquid in supernis sive terrenis rebus convenienter secundum Auctoris sui dispositionem geritur, ab hac disciplina non refertur exceptum" (Mynors 149.7–9). Translation from McKinnon, "Cassiodorus," 36. On Aristides Quintilianus's proem, see pp. 541–42 *supra*.

[101] On the influence of Cassiodorus's *Institutiones* on later medieval music theory, see Phillips, "Classical and Late Latin Sources," 108–18; and Huglo, "Study of Ancient Sources of Music Theory," 163–64. For a useful survey of Cassiodorus's view of music, extending beyond the single section of the *Institutiones*, see Schueller, *Idea of Music*, 273–78.

[102] See Louis Holtz, "Quelques aspects de la tradition et de la diffusion des Institutions," in *Flavio Magno Aurelio Cassiodoro. Atti della settimana di studi su Cassiodoro. Cosenza Squillace, settembre 1983* (Squillace: Rubbettino, 1984),

Although Isidore of Seville was widely read by later medieval writers, who regarded him as one of the authorities through whom ancient knowledge had been transmitted, later authors increasingly turn their attention away from the preservation of an ancient scientific and musical culture, concentrating instead on the more practical demands of providing a theoretical framework for the new liturgical music. Latin writers ranging from Censorinus through Isidore had preserved a sufficient amount of technical detail from the tradition of ancient Greek music theory for later music theorists to adapt in devising names for notes, developing a theory of ecclesiastical tones or modes, considering the sizes of tones and semitones, or formulating theories of musical cosmology or aesthetics—especially from a Christian perspective—, but these were merely jumbled parts and trappings of a remote and forgotten tradition. From the mid-seventh century until quite late in the Middle Ages, the development of medieval Latin music theory has its own history, separate from the subject of this book.[103]

While Latin authors in the West and Islamic scholars were concerned with preserving or appropriating an ancient heritage through translation and adaptation, the Greek East seems to have felt little need to expand on its store of scientific literature in the period between the last decades of the fifth century C.E. and the establishment of a new university at Constantinople in the eleventh century.[104] It is nevertheless certain that the Eastern

---

281–312; Phillips, "Classical and Late Latin Sources," 112; and Michel Huglo, "Die *Musica Isidori* nach den Handschriften des deutschen Sprachgebietes," in *Mittelalterliche Musiktheorie in Zentraleuropa,* ed. Walter Pass and Alexander Rausch, Musica mediaevalis europae occidentalis, vol. 4 (Tutzing: Hans Schneider, 1998), 79–86. For a translation of the musical section of the *Etymologiae,* see "Isidore of Seville, from the *Etymologies,*" in *Strunk's Source Readings in Music History,* vol. 2, *The Early Christian Period and the Latin Middle Ages,* ed. James McKinnon (New York: Norton, 1998), 37–43; for a general overview of Isidore's *Etymologiae,* see Schueller, *Idea of Music,* 278–82.

[103] The best available treatment of the subject is Michael Bernhard, Arno Borst, Detlef Illmer, Albrecht Riethmüller, Klaus-Jürgen Sachs, and Frieder Zaminer, *Rezeption des antiken Fachs im Mittelalter,* Geschichte der Musiktheorie, vol. 3 (Darmstadt: Wissenschaftliche Buchgesellschaft, 1990).

[104] As G. H. Jonker writes (p. 31) in his edition of the treatise of Bryennius (see chapter 2, n. 192 *supra*): "It is hardly conceivable that between the 4th and the 10th centuries not one treatise upon the theory of music should have been written in the Greek language, apart from pseudo-Psellus' *Synopsis* ...; but the

schools at Alexandria, Antioch, Athens, Beirut, Constantinople, and Gaza continued the tradition of the *tetraktys* (the *quadrivium* in the West) as it had been known in antiquity. Arithmetic was based on Nicomachus and John Philoponus's commentary, geometry on Euclid, astronomy on Ptolemy, and music on Ptolemy, Cleonides, Aristoxenus, and Aristides Quintilianus.[105] Byzantine scholars of this period make specific references to these and other theorists, even quoting occasionally from their treatises.[106]

The reasons for this period of stasis are no doubt related to the political preoccupations of the sixth-century emperors, especially Justinian (reigned 527–565), who closed the schools of philosophy in Athens in 529; the replacement of the old university at Constantinople in the seventh century with a new Ecumencial College controlled by the Church, which at that time had little interest in literature and the ancient sciences; and the terror brought about by Iconoclasm in the eighth and ninth centuries, during which the Ecumenical College was closed and public support disappeared for any sort of higher education. Following the demise of Iconoclasm in the mid-ninth century, intellectual interests revived under the new Macedonian dynasty, and extant manuscripts of this period provide evidence of a renewed study of the traditions of ancient Greek science.[107]

This intellectual revival is clearly reflected in the new medium of the paper codex: as it came to supplant papyrus and the roll, the new structure required fresh copies of texts in a new, smaller cursive script. Works that might have been lost from natural deterioration of papyrus were thereby preserved.[108] As a nat-

---

fact remains that out of that period nothing comparable to the work of Pachymeres and Bryennius is extant."

[105] The most comprehensive treatment of this relatively little-known period of scholarship is N. G. Wilson, *Scholars of Byzantium* (Baltimore, MD: Johns Hopkins University Press, 1983).

[106] Discussion of this subject appears in Mathiesen, "Hermes or Clio?" (see chapter 4, n. 6 *supra*).

[107] For the general manuscript evidence of this period, see Wilson, *Scholars*, 85–88; for the earliest surviving manuscript of ancient Greek music theory, which dates from the eleventh century, see Mathiesen, *RISM BXI*, 14 (further discussion of this manuscript follows *infra*).

[108] As Wilson observes (*Scholars*, 85; see also 63–68): "Although many manuscripts have survived through lucky accidents, it cannot be entirely coinci-

ural outgrowth of this renewed study of texts, the revival is also reflected in the areas of antiquarian studies and lexicography, represented by such important works as Photius's *Bibliotheca,* the *Suda,* and the *Etymologicon magnum.*[109]

These works give evidence of the survival in the ninth and tenth centuries of much ancient literature that no longer exists today, as well as a considerable amount that does. None of them, however, could have provided the detailed links with the ancient Greek musical treatises that are apparent in the later Byzantine treatises written around the turn of the fourteenth century, and it is obvious, both from the surviving manuscripts themselves and from the internal content of these later treatises, that most—if not all—of the ancient Greek musical treatises known today were available to such Byzantine scholars as George Pachymeres (1242–ca. 1310), Maximus Planudes (1255–1305), Theodorus Metochites (1270–1332), and Manuel Bryennius (fl. 1300) in the thirteenth and early fourteenth century.[110]

What led to this remarkable change in interest, why were the ancient Greek musical treatises preserved when so much other literature was lost, and how did they come to be known once again? The answer to these questions leads to the eleventh century and the scholar and statesman Michael Psellus, who provided the intermediate link between the theoretical tradition of antiquity and the archaicizing tradition that produced such writers as Pachymeres and Bryennius during the Palaeologan renaissance.

Michael Psellus was born near the end of the fifty-year reign of the emperor often regarded as the greatest of Byzantium, Basil II, whose reign extended from 976 to 1025. The period of Psellus's life is one of considerable importance in both the East and the West. It

---

dence that has led to the preservation of a number of copies of ancient authors transcribed in the ninth century."

[109] These collections, preserving a wealth a material about ancient Greek music, were used extensively in chapters 2 and 3. On Photius and his *Bibliotheca,* see Wilson, *Scholars,* 89–119; and p. 28, n. 11 *supra.* On the *Etymologicon magnum,* see p. 30, n. 16; and on the *Suda,* p. 33, n. 26 *supra.*

[110] Earlier studies have attempted to demonstrate the way in which the Byzantine treatises were fashioned by making use of ancient Greek sources, especially the treatise of Aristides Quintilianus. See, for example, Lukas Richter, "Antike Überlieferungen in der byzantinischen Musiktheorie," *Deutsches Jahrbuch der Musikwissenschaft* 6 (1962): 75–115; and Mathiesen, "Aristides Quintilianus and the *Harmonics* of Manuel Bryennius" (see chapter 4, n. 7 *supra*).

spans the Great Schism of 1054—the event that culminated two hundred years of increasing asperity between the Eastern and Western churches. The schism was a momentous event from the perspective of Western writers such as Cardinal Humbert, who describes it in his *Commemoratio brevis*.[111] In a very real sense, the schism encouraged the Western church to turn away once and for all from tradition and give full reign to its own dynamic and increasingly restive intellectual forces. The remarkable changes in Western music theory and practice that occur during and just after this period are certainly no coincidence. Byzantine historians, by contrast, ignored the schism. For the East, this was a period more than ever intent on preserving, transmitting, and reinterpreting the tradition of antiquity. The intellectual renaissance that began in the tenth century during the reign of Constantine VII Porphyrogenitus (912–959) flowered in the eleventh century, even as political stagnation and military decline began under Basil's successors Constantine VIII, who reigned from 1025 to 1028, and his successor Romanus III Argyrus, who reigned until 1034.

Psellus played a leading role in eleventh-century Byzantium, combining his intellectual interests with an extraordinary life at the center of the court. As his was not the life of the musical scholar, in the sense ordinarily envisioned in the West, it bears recounting.

Michael Psellus was born in 1018, and according to his own account, he was a gifted student and captivating personality. He writes in his *Chronographia* 6.44–46:

> As to my career, even before the fruit was mature, the blossom foreshadowed an illustrious future. The emperor himself [i.e., Constantine IX Monomachus] did not yet know me, but his entire entourage did, some recounting to him one of my abilities, others praising another, while also adding that eloquence graced my lips. ... This [quality] first brought me into contact with the emperor, ... When I first entered his presence I expressed myself without fluency or elegance; yet I described my family and the kind of preparation I had received in literature. The emperor ... almost embraced me, so affected was he at the sound of my voice. For others access to him was fixed and limited, but for me, on the other hand, the doors of his heart were opened and,

---

[111] Edited in C. Will, *Acta et scripta quae de controversiis ecclesiae graecae et latinae saec. XI composita extant* (Leipzig, 1861), 150–52.

as little by little I grew closer to him, all of his secrets were revealed to me.[112]

By the age of thirty, Psellus had already become a highly influential advisor in the imperial court, together with his friends Constantine Leichudes, the prime minister (μεσάζων), and John Xiphilinus, the jurist. These three men's lives were inextricably interwoven. In 1045, under Emperor Constantine IX Monomachus, who reigned from 1042 to 1055, a new university was established in Constantinople with faculties of philosophy and law. Psellus was appointed head of the faculty of philosophy, with the title "Consul [ὕπατος] of Philosophers," while his friend Xiphilinus became "Guardian of Law [νομοφύλαξ]." By this time, Psellus must have already written his works on music and the other quadrivial sciences—the Σύνταγμα εὐσύνοπτον εἰς τὰς τεσσάρας μαθηματικὰς ἐπιστήμας, which includes the Τῆς μουσικῆς σύνοψις ἠκριβωμένη—and perhaps the Προλαμβανόμενα εἰς τὴν ῥυθμικὴν ἐπιστήμην. The treatise Περὶ τραγῳδίας; three letters on music, the most famous of which is almost certainly addressed to Emperor Constantine IX Monomachus; and his other philosophical works, including the treatise on Plato's Psychogeny, were probably written between 1045 and 1055.[113]

---

[112] Ἐμοὶ δὲ καὶ πρὸ τοῦ τελείου καρποῦ ἡ ἄνθη τὸ μέλλον προεμαντεύετο· καὶ ὁ μὲν βασιλεὺς οὔπω ἐγνώκει, ἡ δὲ περὶ ἐκεῖνον δορυφορία ξύμπασά με ᾔδει, καὶ ἄλλος ἄλλο τι τῶν ἐμῶν διηρίθμει τῷ βασιλεῖ, προστιθέντες ὅτι μοι καὶ χάρις διαπρέπει τοῖς χείλεσιν. ... Τοῦτό με τοίνυν πρῶτον εἰς βασιλέα συνίστησι, ... Καὶ εἰρήκειν μὲν εἰσιὼν τὴν πρώτην οὔτε στωμύλον οὔτε κομψὸν, ἀλλ' ἐγὼ μὲν τὸ γένος κατέλεγον καὶ οἵαις ἐχρησάμην περὶ τοὺς λόγους παρασκευαῖς, ὁ δὲ ... μικροῦ με δεῖν κατεφίλησεν, οὕτω μου τῆς γλώττης εὐθὺς ἀπῃώρητο. Τοῖς μὲν οὖν ἄλλοις καιρὸν εἶχε καὶ μέτρον ἡ πρὸς αὐτὸν εἴσοδος, ἐμοὶ δὲ καὶ αἱ τῆς καρδίας αὐτῷ πύλαι ἀνεπετάννυντο, καὶ κατὰ βραχὺ προϊόντι ξύμπαντα ἐπεδείκνυτο (Michael Psellos, *Chronographie ou histoire d'un siècle de Byzance (976–1077,* 2 vols., ed. and trans. Émile Renauld, Collection Byzantine (Paris: Les Belles Lettres, 1926–28), 1:138–40. Translation from Deno John Geanakoplos, *Byzantium: Church, Society, and Civilization Seen through Contemporary Eyes* (Chicago: University of Chicago Press, 1984), 262–63.

[113] The Σύνταγμα has been edited in J. L. Heiberg, *Anonymi logica et quadrivium, cum scholiis antiquis,* Det Kgl. Danske Videnskabernes Selskab. Hist.-filol. Meddelelser, vol. 15/1 (København: Høst, 1929); the Προλαμβανόμενα (on which, see pp. 335–43 *supra*) in Pearson, *Elementa rhythmica,* and in G. B. Pighi, *Aristoxenus Rhythmica: Elem. rhythm., Psell., Exc. Neap. (R. Westphal 1867), POxy 9 (Grenfell, Hunt, Blass 1898)* (Bologna: Riccardo Pàtron, 1959); the Περὶ τραγῳδίας (on which, see pp. 98–109, 119–20 *supra*) in Browning, "Byzantine Treatise on Tragedy" (see chapter 2, n. 152 *supra*); the three letters (on which, see

In 1055, as an aftermath of the schism, Psellus fell out of favor at the court and retired briefly to a monastery. But by June 1057, he was already back in favor and was sent by the new emperor, Michael VI Stratioticus, to negotiate a settlement with the rebellious general Isaac Comnenus. Meanwhile, Michael Cerularius, Patriarch of Constantinople and friend of Psellus, intervened. Michael VI Stratioticus was himself forced to abdicate, and Isaac Comnenus thus became Emperor on 1 September 1057. The emissaries, it seems, had been careful to test the prevailing wind. Emperor Isaac invested Psellus with the new title of President (πρόεδρος), while Leichudes continued as prime minister. In 1058, after a series of disagreements with the Patriarch, the Emperor decided to depose and replace him with someone less independent. Psellus was now engaged to write the accusation against Patriarch Michael, in which he charged the Patriarch with all sorts of blasphemies and heresies. While the synod of deposition was still sitting, Patriarch Michael conveniently died, Leichudes became Patriarch, and Psellus became prime minister. Only a year later, at the urging of Psellus, Emperor Isaac himself resigned and retired to the Studite monastery.

Isaac was succeeded by Emperor Constantine X Ducas, who reigned from 1059 to 1067 and was a close friend of Psellus and Leichudes. In fact, Psellus himself had arranged the accession, and it was Psellus who placed the purple buskins on the Emperor's feet. When Constantine X died, Psellus ran the government while Constantine's wife acted as regent for their young sons.

The previous emperors had not maintained Basil II's military, and this neglect led to serious disasters at the frontiers in a series of conflicts with the Seljuqs. Demands for a strong military government increased to the point where the Empress and Patriarch Xiphilinus could no longer ignore them. Over the objections of Psellus, the Empress married an experienced general, making him Emperor Romanus IV Diogenes on 1 January 1068. Romanus attempted to reverse the military decline, but after three years, his

---

p. 394 *supra*) in Charles-Emile Ruelle, *Études sur l'ancienne musique grecque* (Paris: Impr. nationale, 1875) (=*Archives des missions scientifiques et littéraires* III/2 [1875]: 497–627); and the Psychogeny in A. J. H. Vincent, *Notice sur trois manuscrits grecs relatifs à la musique, avec une traduction française et des commentaires,* Notices et extraits des manuscrits de la Bibliothèque du Roi, vol. 16/2 (Paris: Impr. Royale, 1847), 316–37.

armies were annihilated in August of 1071, perhaps due in part to treachery from his opponents at court. In any event, the Emperor was taken prisoner and, shortly thereafter, deposed by Psellus's faction. Psellus's own pupil, Michael VII Ducas, was proclaimed sole emperor in October 1071, and Psellus's power was now at its height.

When Romanus was released after negotiating a treaty with the Seljuqs, his return precipitated a brief civil war. The conflict ended when Romanus surrendered himself on a guarantee of immunity in person signed on behalf of Michael VII. This guarantee notwithstanding, his eyes were put out before he could return to Constantinople, and he died shortly thereafter. Romanus's death, of course, nullified his treaty, and the Turkish Sultan was therefore free to invade Byzantium. Simultaneously, on the Western front, the Normans completed their conquest of Byzantine possessions in Italy.

Michael VII Ducas, bewildered by events, turned to the charismatic Logothete Nicephoritzes, who expelled Psellus and took over the government. Nothing, however, could stem the disaster of Michael's reign, and he too was forced to abdicate in 1078. In a fitting irony, Psellus, whose influence had grown with every emperor, was thrust aside during the reign of his own pupil. He disappears from view but may have lived on in monastic retirement.[114]

Psellus is remembered today principally for his *Chronographia* and the collection *De omnifaria doctrina*—works that, despite their popularity in the eleventh century, survive in only one or two manuscript copies. But as a scholar, Psellus was greatly concerned with the quadrivial studies, philosophy, and theology. The curriculum of philosophy at his university was solidly based on the seven liberal arts, and his works in these fields, as well as his philosophical works, probably served this curriculum. His smaller theological works may have been used in the university, but they were more likely written as part of his work at court, which was constantly involved in balancing imperial and patriarchal claims to power and authority. Unlike the better-known *Chronographia* and *De omnifaria doctrina,* works such as the Σύνταγμα, the Προλαμβανόμενα εἰς τὴν ῥυθμικὴν, and the Platonic Psychogeny survive in dozens of manuscripts, attesting to their influence and value. Various editions have appeared here and there since the sixteenth century, but the works have never received a full critical edition and, with the exception of Lukas Richter, almost no serious scholarly attention.[115]

---

[114] This survey is based on Ostrogorsky, *History of the Byzantine State,* 298–350.

To some extent, modern scholarly neglect is the result of doubt about the authenticity of the Σύνταγμα and its individual component parts. Two bases have been advanced for questioning the authenticity: first, because it is a compendium of material drawn from Aristotle's *Organon* and—for the μουσικὴ σύνοψις and ῥυθμικὴ ἐπιστήμη—the writings of Theon of Smyrna, Aristoxenus, Cleonides, Nicomachus, and Gaudentius; and second, because another author is supposed to have been given in the earliest manuscript source. As to the first argument, in fact just these sorts of compendia are common in Byzantine scholarship (ready examples are provided by the treatises of Pachymeres and Bryennius), and the reworking of traditional materials is a primary feature of Byzantine culture. Indeed, it would be more surprising if the Σύνταγμα and its individual component parts were not compendious. This feature alone is hardly sufficient as a basis for questioning the work's authenticity. The second argument seems more telling, and it requires a somewhat closer examination.

In the earliest manuscript source for the Τῆς μουσικῆς σύνοψις ἠκριβωμένη—a source contemporary with Psellus—the treatise does not carry an author attribution. Richter observed that the colophon of this manuscript, Heidelbergensis Palatinus gr. 281, states: "daß die collectio (d.h. die beiden Hauptbestandteile Logik und Quadrivium) *a Romano secretario et iudice Seleuciae per manus Nicolai scribae compilata est.*"[116] But the colophon is in fact written in Greek, not Latin, and this is not what it states. In the same fashion used to identify the patron of a book in countless colophons to other composite codices, this colophon—written by the scribe, Nicolaos Kalligraphos—states "this book was assembled from many works of Imperial Secretary Romanus, judge at Seleucia and my master. All you who read it, pray for him."[117] The colophon does not refer to "die beiden Hauptbestandteile," but to the entire book, which contains a series of treatises by Psellus, Leontius, Photius, and Theodore Abucara. Richter also follows the earlier scholars Théodore Reinach and V. Rose in asserting that the treatise is attributed to a certain Gregorius Solitarius in two manuscripts in Florence.[118] This attribution is, however, once again a misinterpretation of a colophon; Solitarius is not a part of Gregory's name. The colophon actually states: "The lowly Gregory wrote these things surrounded by the solitary lovers of learning among the religious, for the benefit of learning ...."[119]

---

[115] See n. 110 *supra;* and Lukas Richter, "'Psellus' Treatise on Music' in Mizler's 'Bibliothek,'" in *Studies in Eastern Chant* 2 (1971): 112–28 (edited version of "'Des Psellus vollständiger kurzer Inbegriff der Musik' in Mizlers 'Bibliothek': ein Beitrag zur Rezeption der byzantinischen Musiktheorie im 18. Jahrhundert," *Beiträge zur Musikwissenschaft* 9 [1967]: 45–54). The edition of Heiberg (see n. 113 *supra*) does not take full account of all the available manuscripts.

[116] Richter, "Antike Überlieferungen," 95.

Neither argument questioning the authenticity of these works stands up to scrutiny. The first is based on questionable assumptions about Byzantine scholarship and the second is based on misreadings of colophons. These works, like those of other authors, appear in numerous manuscripts attributed to Psellus and in some manuscripts without an author attribution. In a few cases, they are even attributed to an author who lived after the earliest surviving manuscript exemplars. When the more than fifty codices containing Psellus's writings and ranging from the eleventh through the sixteenth century are examined and the testimony of the manuscripts is taken as a whole—that is, chronology, content, context, and attribution—most of the evidence favors

---

[117] ἡ βίβλος ... ἐκ πολλῶν πονημάτων Ῥομανοῦ ἀσηκρῆτις καὶ κριτοῦ Σελευκείας συλλεγεῖσα· τοῦ καὶ αὐθέντου μου· οἱ ἀναγινώσκοντες αὐτὴν, εὔχεσθε ὑπὲρ αὐτοῦ (Mathiesen, *RISM BXI*, **14** [p. 33]). An ἀσηκρῆτις is a particular Byzantine official; I am indebted to my colleague Professor Martha Vinson for this clarification. H. Stevenson interprets it as equivalent to *a secretis* in Latin (see *Bibliotheca Apostolica Vaticana codicibus manuscriptis recensita iubente Leone XIII Pont. Max. edita. Codices manuscripti Palatini graeci Bibliothecae Vaticanae descripti*, Praeside I. B. Cardinali Pitra episcopo Portuensi, S. R. E. Bibliothecario, recensuit et digessit H. Stevenson senior (Rome, 1885), 158.

[118] Richter, "Antike Überlieferungen," 95. The two manuscripts are Florentinus Laurentianus 58.20 and 87.10. Rose, followed by the later scholars, was apparently misled by reading the partial transcription of the colophon that appears in A. M. Bandini, *Catalogus codicum manuscriptorum Bibliothecae Mediceae Laurentianae*, 3 vols. (Florence: Typis Regiis, 1764–70; reprint, Leipzig: Zentral-Antiquariat der Deutschen Demokratischen Republik, 1961), 2:459–62 (58.20) and 3:389–91 (87.10).

[119] ὁ ταπεινὸς τάδ' ἔγραψεν ἐν μονοτρόποις Γρηγόριος τοῖς φιλομαθέσι εὐσεβῶν, εἰς εὐμάθειαν ... (Vaticanus gr. 698, f. 104v).

Psellus as author, with little if any evidence opposed. Whether these works were authored by Psellus or not is finally of less importance than the fact that they were transcribed over and over again in the manuscripts as the work of Psellus, and their historical influence was certainly that of authentic works.

Psellus's principal sources in Τῆς μουσικῆς σύνοψις ἠκριβωμένη were Theon of Smyrna, Nicomachus of Gerasa, Gaudentius, and Cleonides. The treatise follows the seven general Aristoxenian categories: (1) definition of fundamental principles and the attributes of tones, (2) intervals, (3) scales, (4) genera, (5) tonoi, (6) modulation, and (7) composition.[120] The procedure has been to take passages from the ancient authorities and assemble them with necessary transitions, summary remarks, and occasional comparisons of the ancient and Byzantine music. In the Προλαμβανόμενα εἰς τὴν ῥυθμικὴν ἐπιστήμην, Psellus clearly has access to the now-fragmentary *Rhythmica* of Aristoxenus and the *De musica* of Aristides Quintilianus, while in the treatise Περὶ τραγῳδίας, he draws on Aristoxenus, Book VIII of Aristotle's *Politica,* Plutarch, and Aristides Quintilianus. In his three letters on music, Psellus reviews the legendary history of music, the numerical bases for harmonic consonance, and the character and effect of music. In this last letter, he considers music as a reflection of higher universal harmony and the world of the Ideas and shows the influence of Platonic and neo-Platonic sources. The letters, as would be expected, are more narrative than expository in style. Finally, in his commentary on Plato's Psychogeny, Psellus makes use of Proclus's commentary on *Timaeus* and Ptolemy's *Harmonica,* Book I, section 10. Taken as a whole, the quadrivial and philosophical works make it clear that Psellus had available to him the bulk of the corpus of ancient Greek music theory, including some works no longer extant, and that he gave these sources a very close reading. Thus, the reputation Psellus enjoyed in his own lifetime for astounding learning based on direct study of original sources would seem to be fully justified.[121]

---

[120] See chart in Richter, "Antike Überlieferungen," 96.

[121] Ostrogorsky (*Byzantine State,* 328) observes: "His knowledge covered all fields and simply astounded his contemporaries. ... He was not satisfied with studying the neoplatonists, he went direct to the source and learned to know Plato, and to make him known, and in so doing conferred incalculable benefits on

No figure of the eleventh century comparable to Psellus can be found in the East or the West. If he was responsible for the first systematic study of the tradition of ancient Greek music theory in the Middle Ages, credit may also be due to him—at least indirectly—for the compilation of the four earliest surviving *codices musici,* that is, codices devoted to ancient Greek musical treatises.

The earliest of the codices preserving Psellus's musical works, Heidelbergensis Palatinus gr. 281, was completed by 14 January 1040.[122] The codex was conceived as a complete book; there are no blank leaves or sides. In addition to the works of Psellus, it includes an excerpt from Leontius on the hypostases, chapter 38 from Photius's *Quaestiones ad Amphilochium,* and ten short theological treatises by Theodore Abucara, all of which point back to the libraries of the ninth century. The codex then continues with the so-called *koine hormasia* (ἡ κοινὴ ὁρμασία ἡ ἀπὸ τῆς μουσικῆς μεταβληθεῖσα)—a kind of tuning diagram—and an accompanying canon;[123] a "Division of a Musical Canon" (Μουσικοῦ κανόνος κατατομή), comprised of three separate excerpts from Theon's *Expositio;* a short explanation of the musical ratios and genera, part of which corresponds to section 103 of Bellermann's Anonymous; and the Anecdoton from the treatise of Bacchius.[124]

Later Byzantine scholars such as Planudes, Pachymeres, and Bryennius made use of at least three codices that can be confidently placed in the capital during their time: Vaticanus gr. 191, Vaticanus gr. 2338, and Venetus Marcianus gr. app. cl. VI/3, three manuscripts that have been encountered many times earlier in this book as the earliest and most important sources for the various treatises on ancient Greek music theory known today.[125] It is,

---

both his own contemporaries and posterity. He was the greatest Byzantine philosopher and the first great humanist."

[122] For a full description, see Mathiesen, *RISM BXI,* 14.

[123] No entirely satisfactory explanation of the *koine hormasia* has been published. For an edition, see Pöhlmann, *Denkmäler,* 32–35. Additional manuscripts preserving this document are described in Mathiesen, "New Fragments," 16.

[124] On the excerpt from Theon's *Expositio,* see pp. 413–14 *supra;* on Bellermann's Anonymous, see pp. 293, 585, 591, and 605 *supra* and 665–66 *infra;* and on the Anecdoton, see pp. 591–92 *supra.*

[125] Mathiesen, "Aristides Quintilianus and the *Harmonics* of Manuel Bryennius," 31–47. In an independent study, André Barbera ("Reconstructing Lost Byzantine Sources," 38–67) confirmed the relationship of these same three codices and postulated a number of linking hyparchetypes.

of course, no coincidence that these three codices, important as sources for Byzantine music theorists, are among the most important manuscripts preserving the corpus of ancient Greek music theory. Moreover, these codices, central to later Byzantine musical scholarship, can be linked in an expanded web to Heidelbergensis Palatinus gr. 281 and its various descendents, as is shown in figure 107.

Figure 107 shows these four manuscripts as well as an additional twelfth-century manuscript (Venetus Marcianus gr. app. cl. VI/10) with a short list of their contents, bracketed to indicate various groupings that are preserved in later codices. In fact, the majority of the surviving *codices musici* exhibit combinations of groups of treatises, articulated in many cases by an intervening blank folio (or folios). Examination of patterns of groups and blanks may reveal lines of descent from earlier exemplars and conflations of these lines in later manuscripts.[126] Figure 107 illustrates some of these lines of descent and conflations in four thirteenth-century codices (Monacensis gr. 361a [*RISM BXI,* **22**], Vaticanus gr. 186 [*RISM BXI,* **210**], Vaticanus gr. 191 [*RISM BXI,* **214**], and Vaticanus gr. 192 [*RISM BXI,* **215**]), two fourteenth-century codices (Vaticanus gr. 176 [*RISM BXI,* **208**] and Matritensis gr. 4678 [*RISM BXI,* **59**]), two fifteenth-century codices (Bononiensis gr. 2432 [*RISM BXI,* **158**] and Parisinus Supplementarius gr. 449 [*RISM BXI,* **114**]), one sixteenth-century codex (Vaticanus gr. 1033 [*RISM BXI,* **222**]), and a few selected later codices. The lines do not necessarily indicate that one codex was copied from another, although in some cases they almost certainly were. Instead, they indicate the ways in which the exemplars branched out and were combined in later codices. From the seventeen surviving codices of the eleventh, twelfth, and thirteenth centuries (eight of which are represented in figure 107) at least some of the twenty-three surviving fourteenth-century codices derive, and these in turn contributed significantly to the more than two hundred surviving

---

[126] For a full discussion of this matter, see Mathiesen, "*Ars critica* and *Fata libellorum*" (chapter 4, n. 96 *supra*); and Barbera, "Reconstructing Lost Byzantine Sources."

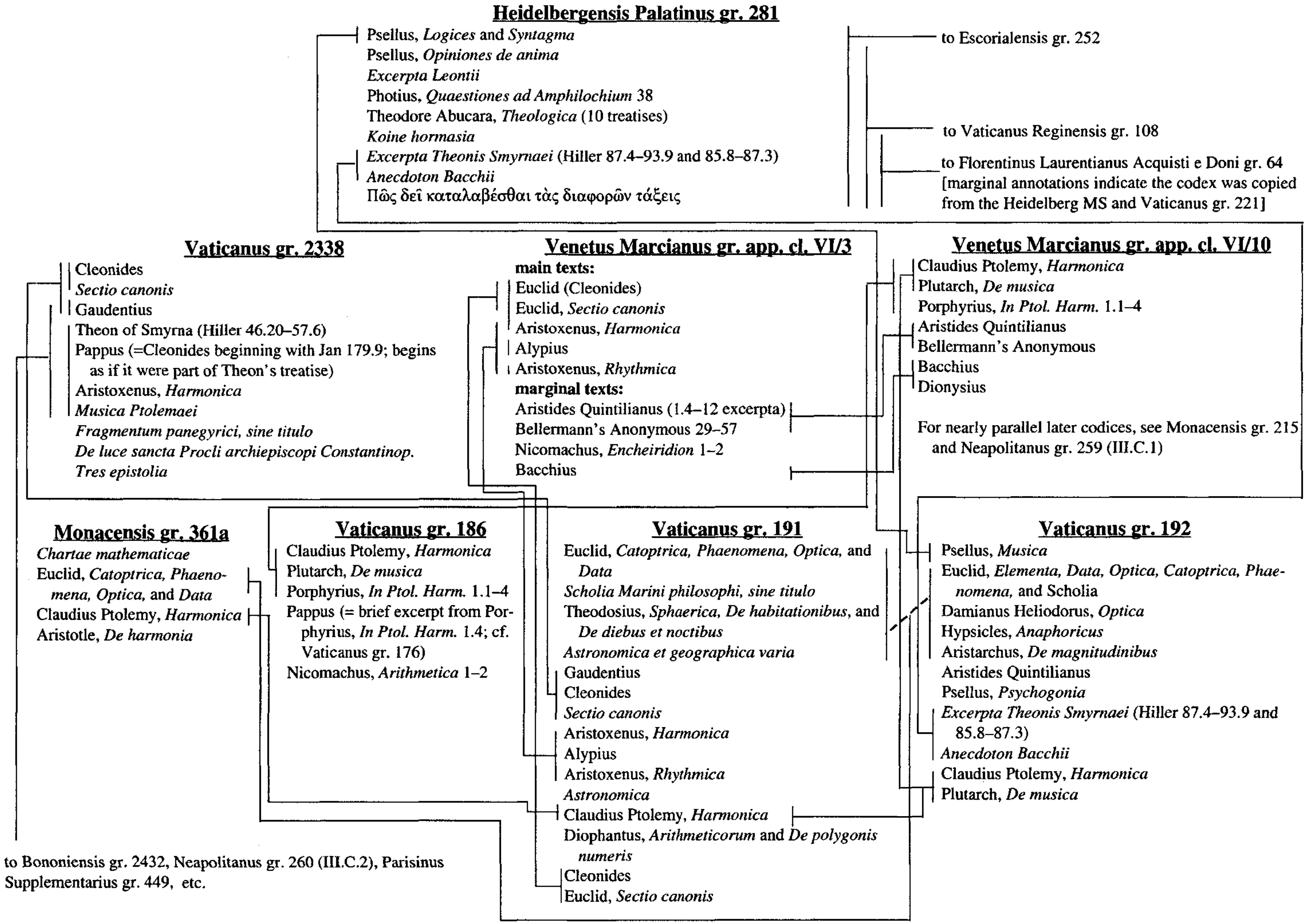
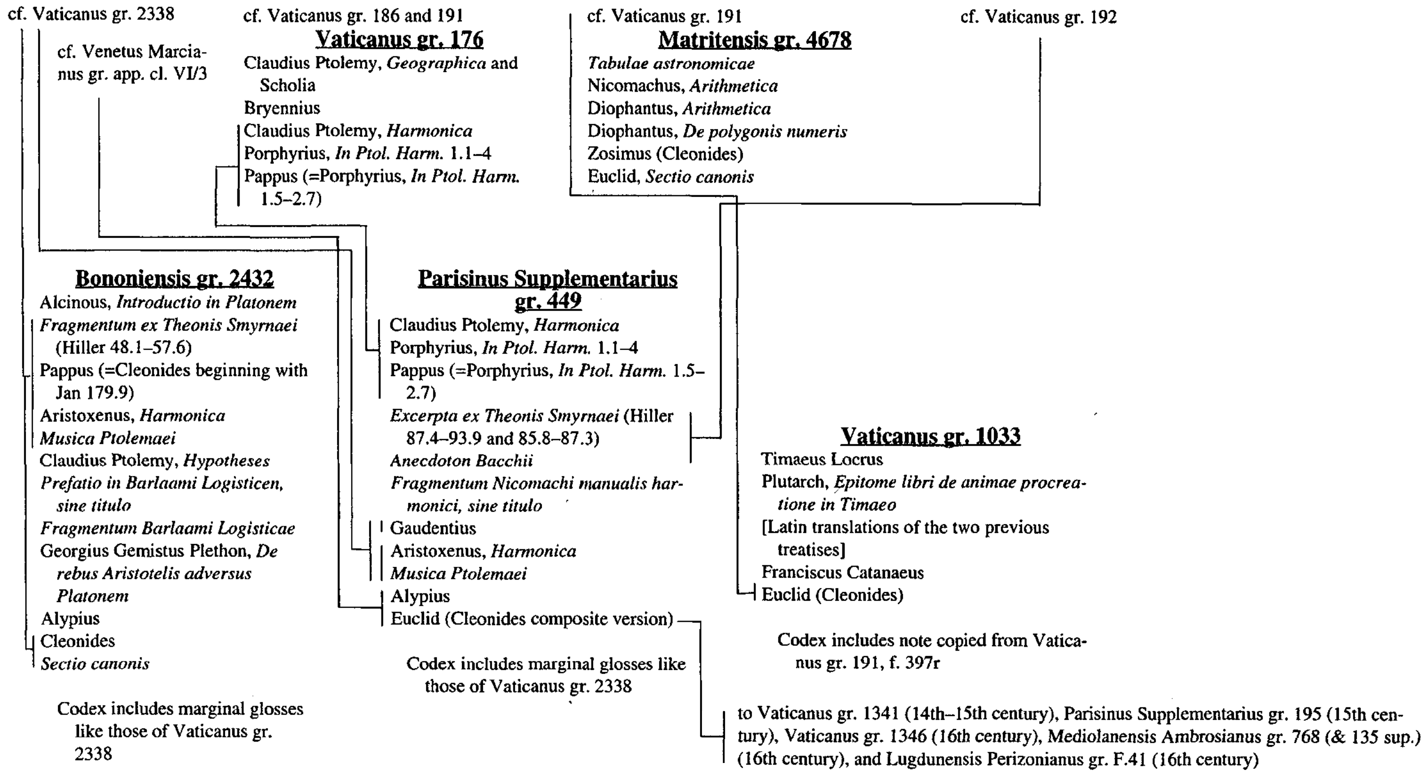

Heidelbergensis Palatinus gr. 281
Psellus, Logices and Syntagma
Psellus, Opiniones de anima
Excerpta Leontii
Photius, Quaestiones ad Amphilochium 38
Theodore Abucara, Theologica (10 treatises)
Koine hormasia
Excerpta Theonis Smyrnaei (Hiller 87.4–93.9 and 85.8–87.3)
Anecdoton Bacchii
Πῶς δεῖ καταλαβέσθαι τὰς διαφορῶν τάξεις
to Escorialensis gr. 252
to Vaticanus Reginensis gr. 108
to Florentinus Laurentianus Acquisti e Doni gr. 64 [marginal annotations indicate the codex was copied from the Heidelberg MS and Vaticanus gr. 221]
Vaticanus gr. 2338
Cleonides
Sectio canonis
Gaudentius
Theon of Smyrna (Hiller 46.20–57.6)
Pappus (=Cleonides beginning with Jan 179.9; begins as if it were part of Theon's treatise)
Aristoxenus, Harmonica
Musica Ptolemaei
Fragmentum panegyrici, sine titulo
De luce sancta Procli archiepiscopi Constantinop.
Tres epistolia
Venetus Marcianus gr. app. cl. VI/3
main texts:
Euclid (Cleonides)
Euclid, Sectio canonis
Aristoxenus, Harmonica
Alypius
Aristoxenus, Rhythmica
marginal texts:
Aristides Quintilianus (1.4–12 excerpta)
Bellermann's Anonymous 29–57
Nicomachus, Encheiridion 1–2
Bacchius
Venetus Marcianus gr. app. cl. VI/10
Claudius Ptolemy, Harmonica
Plutarch, De musica
Porphyrius, In Ptol. Harm. 1.1–4
Aristides Quintilianus
Bellermann's Anonymous
Bacchius
Dionysius
For nearly parallel later codices, see Monacensis gr. 215 and Neapolitanus gr. 259 (III.C.1)
Monacensis gr. 361a
Chartae mathematicae
Euclid, Catoptrica, Phaenomena, Optica, and Data
Claudius Ptolemy, Harmonica
Aristotle, De harmonia
Vaticanus gr. 186
Claudius Ptolemy, Harmonica
Plutarch, De musica
Porphyrius, In Ptol. Harm. 1.1–4
Pappus (= brief excerpt from Porphyrius, In Ptol. Harm. 1.4; cf. Vaticanus gr. 176)
Nicomachus, Arithmetica 1–2
Vaticanus gr. 191
Euclid, Catoptrica, Phaenomena, Optica, and Data
Scholia Marini philosophi, sine titulo
Theodosius, Sphaerica, De habitationibus, and De diebus et noctibus
Astronomica et geographica varia
Gaudentius
Cleonides
Sectio canonis
Aristoxenus, Harmonica
Alypius
Aristoxenus, Rhythmica
Astronomica
Claudius Ptolemy, Harmonica
Diophantus, Arithmeticorum and De polygonis numeris
Cleonides
Euclid, Sectio canonis
Vaticanus gr. 192
Psellus, Musica
Euclid, Elementa, Data, Optica, Catoptrica, Phaenomena, and Scholia
Damianus Heliodorus, Optica
Hypsicles, Anaphoricus
Aristarchus, De magnitudinibus
Aristides Quintilianus
Psellus, Psychogonia
Excerpta Theonis Smyrnaei (Hiller 87.4–93.9 and 85.8–87.3)
Anecdoton Bacchii
Claudius Ptolemy, Harmonica
Plutarch, De musica
to Bononiensis gr. 2432, Neapolitanus gr. 260 (III.C.2), Parisinus Supplementarius gr. 449, etc.

Figure 107.[127]

---

[127] This chart was originally published in Mathiesen, "Hermes or Clio?" 12–13.


cf. Vaticanus gr. 2338
cf. Venetus Marcianus gr. app. cl. VI/3
cf. Vaticanus gr. 186 and 191
Vaticanus gr. 176
Claudius Ptolemy, *Geographica* and Scholia
Bryennius
Claudius Ptolemy, *Harmonica*
Porphyrius, *In Ptol. Harm.* 1.1–4
Pappus (=Porphyrius, *In Ptol. Harm.* 1.5–2.7)
cf. Vaticanus gr. 191
Matritensis gr. 4678
Tabulae astronomicae
Nicomachus, *Arithmetica*
Diophantus, *Arithmetica*
Diophantus, *De polygonis numeris*
Zosimus (Cleonides)
Euclid, *Sectio canonis*
cf. Vaticanus gr. 192
Bononiensis gr. 2432
Alcinous, *Introductio in Platonem*
Fragmentum ex Theonis Smyrnaei (Hiller 48.1–57.6)
Pappus (=Cleonides beginning with Jan 179.9)
Aristoxenus, *Harmonica*
Musica Ptolemaei
Claudius Ptolemy, *Hypotheses*
Prefatio in Barlaami Logisticen, sine titulo
Fragmentum Barlaami Logisticae
Georgius Gemistus Plethon, *De rebus Aristotelis adversus Platonem*
Alypius
Cleonides
Sectio canonis
Codex includes marginal glosses like those of Vaticanus gr. 2338
Parisinus Supplementarius gr. 449
Claudius Ptolemy, *Harmonica*
Porphyrius, *In Ptol. Harm.* 1.1–4
Pappus (=Porphyrius, *In Ptol. Harm.* 1.5–2.7)
Excerpta ex Theonis Smyrnaei (Hiller 87.4–93.9 and 85.8–87.3)
Anecdoton Bacchii
Fragmentum Nicomachi manualis harmonici, sine titulo
Gaudentius
Aristoxenus, *Harmonica*
Musica Ptolemaei
Alypius
Euclid (Cleonides composite version)
Codex includes marginal glosses like those of Vaticanus gr. 2338
Vaticanus gr. 1033
Timaeus Locrus
Plutarch, *Epitome libri de animae procreatione in Timaeo*
[Latin translations of the two previous treatises]
Franciscus Catanaeus
Euclid (Cleonides)
Codex includes note copied from Vaticanus gr. 191, f. 397r
to Vaticanus gr. 1341 (14th–15th century), Parisinus Supplementarius gr. 195 (15th century), Vaticanus gr. 1346 (16th century), Mediolanensis Ambrosianus gr. 768 (& 135 sup.) (16th century), and Lugdunensis Perizonianus gr. F.41 (16th century)

Selected later lines of descent:
Argentorati gr. C.III.1 and C.III.31 [destroyed] Londinensis Musei Britannici add. 19353 and Upsaliensis gr. 52
Vaticanus gr. 2338 Cantabrigiensis Universitatis gr. 1464 (Gg.II.34) Parisinus gr. 3027 Parisinus gr. 2535
Neapolitanus gr. 259 (III.C.1) Monacensis gr. 215 Parisinus gr. 2532 Parisinus gr. 2458
Venetus Marcianus gr. 322 Consensus group

Figure 107 (continued).

codices musici of the fifteenth and sixteenth centuries.[128] Thus, it is reasonable to see the most important surviving manuscripts as directly related to the period when Psellus was the leading authority in Byzantine scholarship.

Psellus's position as head of the philosophy faculty in the capital (not to mention his position at court); the extraordinary presence, albeit anonymous, of the treatises of a twenty-two-year-old scholar and statesman in an elegant contemporary codex in the company of such eminent figures as Photius and Leontius; the relationships of this codex to the three most important codices used by the later Byzantine theorists; the inclusion of Psellus's Τῆς μουσικῆς σύνοψις ἠκριβωμένη as well as his treatise on Plato's Psychogeny in a number of codices devoted to ancient Greek music theory; and the remarkable learning exhibited in his quadrivial, philosophical, and theological writings—all these pieces of evidence point to the conclusion that Psellus himself was the founder of the later line of Byzantine music theory and musical scholarship that was to reach its peak in the thirteenth and early fourteenth centuries with the work of Pachymeres and Bryennius.[129]

In the late eleventh and twelfth centuries, under the reign of the Comneni (1081–1185) and the Angeli (1185–1204), the classical tradition that had been rediscovered in the ninth and tenth centuries was assimilated into the intellectual life of the educated classes, even though the church, asserting its authority over the educational enterprise in Constantinople, remained suspicious of the rationalism and technical knowledge derived from the ancient Greek traditions of philosophy and the sciences. The natural tension between sacred and secular studies during this period was completely overwhelmed in 1204 by the Fourth Crusade, which proved to be the most devastating blow the empire had yet suffered. As Nigel Wilson observes in his *Scholars of Byzantium*:

---

[128] For a fuller treatment, including identification of many of the scribes who created these manuscripts, see Mathiesen, "Hermes or Clio?" 3–35.

[129] For an overview of Byzantine intellectual culture, its relationship to the West, and its concern with the preservation of the ancient Greek traditions, see Bolgar, *Classical Heritage*, chapter 2; and Colish, *Medieval Foundations*, chapter 9. On eleventh-century Byzantine scholarship and more particularly Psellus, see Wilson, *Scholars*, chapter 8; and A. P. Kazhdan and Ann Wharton Epstein, *Change in Byzantine Culture in the Eleventh and Twelfth Centuries*, The Transformation of the Classical Heritage, vol. 7 (Berkeley: University of California Press, 1985), chapter 4.

> The libraries being consulted by Photius were still being used by his intellectual successors at the end of the twelfth century and probably still contained most of the rarities listed in the *Bibliotheca*. After 1204 that was no longer true. The Fourth Crusade put an end to the survival of a quantity of literature which is difficult to estimate but certainly included two of the best works of the civilised and witty Callimachus and a much greater mass of historical literature. None of these texts can ever be recovered except by the lucky chance of finds among the papyri.[130]

For the next half century, the Byzantine emperors and intellectuals were primarily occupied with preserving some semblance of their culture in the new Byzantine empire of Nicaea, as well as contriving a way of recapturing Constantinople. By 1261, the reconquest had been accomplished, and Michael VIII Palaeologus was crowned emperor.[131] His dynasty would last until the final collapse of the empire in 1453.

With the establishment of the Palaeologan dynasty, classical studies once again came to the fore, especially under Michael's successor, Andronicus II Palaeologus (reigned 1282–1328). This is the period during which scholars such as Planudes, Pachymeres, and Metochites undertook the study, editing, and organization of the entire body of ancient Greek literature as it was known to them. Among his other works, Pachymeres wrote a *Compendium* on the four traditional mathematical sciences (Σύνταγμα τῶν τεσσάρων μαθημάτων[132])—arithmetic, music, geometry, and astronomy—, following the tradition of Psellus's Σύνταγμα εὐσύνοπτον εἰς τὰς τεσσάρας μαθηματικὰς ἐπιστήμας. Metochites did not write a work specifically devoted to music, but he was associated with two of the most important Byzantine scholars of the ancient Greek musical tradition: Nicephorus Gregoras, his pupil and one of the scholars responsible for the completion of Ptolemy's *Harmonica*;[133] and Manuel Bryennius, who wrote his own comprehensive *Harmonica* and lived for a time with Metochites as his tutor.[134]

---

[130] Wilson, *Scholars*, 218.

[131] For a fuller treatment of these historical events, see Ostrogorsky, *Byzantine State*, 351–465.

[132] For an edition and textual commentary, see Paul Tannery, *Quadrivium de Georges Pachymère ou Σύνταγμα τῶν τεσσάρων μαθημάτων ἀριθμητικῆς, μουσικῆς, γεωμετρίας καὶ ἀστρονομίας;* texte revisé et établi par le R. P. E. Stéphanou A. A., Studi e testi, vol. 94 (Vatican City: Biblioteca Apostolica Vaticana, 1940).

[133] See pp. 431–33 and 490–93 *supra*.

The section of Pachymeres's Σύνταγμα devoted to music provides little more than a synopsis of the ancient Greek theory of intervals, scales, the genera and the shades, consonance and dissonance, and the eight Ptolemaic tonoi,[135] which he viewed as parallel to the eight ἦχοι (*echoi*) of Byzantine chant. Nevertheless, by linking modern practice to ancient tradition, Pachymeres's treatises emphasized the continuity of Greek culture, an important value during the Palaeologan renaissance. No earlier medieval treatment of the tradition is as detailed, with the exception of Boethius's *De institutione musica,* but Pachymeres's *Compendium* does not seem to have enjoyed great popularity: it survives in fewer than twenty manuscripts, all but three of them dating from the sixteenth century or later.

It is quite likely that the *Compendium* of Pachymeres was simply overshadowed by the work of his contemporary Manuel Bryennius, whose *Harmonica* is certainly the most comprehensive and significant of the Byzantine treatises dealing with ancient Greek music theory. Apart from this treatise, almost nothing is known of Bryennius. Sometime prior to 1302, Planudes wrote to Bryennius as an old friend asking him for the loan of his copy of Diophantus's *Arithmetica,* a complicated treatise on indeterminate equations, known at that time, it seems, only to Bryennius, Pachymeres, and perhaps a few other Byzantine polymaths. A few years later, Metochites employed Bryennius as his tutor, especially in the field of astronomy. In one of his letters, he describes Bryennius as having lived a secluded life during which he had been generally regarded as a charlatan, though Metochites himself realized Bryennius was one of the few scholars who possessed real knowledge of the mathematical sciences. For his part, Pachymeres never mentions Bryennius, and while there are some passages in Bryennius's treatise that parallel both Psellus's and Pachymeres's treatises, these are most probably the result of their independent use of common sources. In the end, the meager evidence suggests that Bryennius's *Harmonica* was completed somewhat later than Pachymeres's *Compendium*, probably around 1300.[136]

---

[134] For a survey of the important figures of the Palaeologan renaissance, see Wilson, *Scholars,* chapters 12–13.

[135] Pachymeres relied primarily on the treatises of Ptolemy, Nicomachus, and perhaps Aristoxenus, Cleonides, Theon of Smyrna, and Aristides Quintilianus. For a table of concordances, see Richter, "Antike Überlieferungen," 100–101.

Bryennius's *Harmonica* became quite popular. Forty-nine manuscripts preserve it in complete form, with ten additional manuscripts containing fragments or an epitome of the treatise. Of these, ten date from the fourteenth century, eight from the fifteenth century, thirty-six from the sixteenth century, and five from the seventeenth century.[137] From the first, the treatise seems to have been regarded by the scribes as a complement to Porphyrius's commentary and as a part of the canon of ancient Greek music theory. Although occasionally transmitted alone or separate from Ptolemy's *Harmonica* and Porphyrius's commentary, Bryennius's *Harmonica* quite often appears as the initial treatise in a codex, usually together with the treatises of Ptolemy and Porphyrius; in fact, in a few instances its title is modified to indicate that the treatise is an "exegesis" on the *Harmonica* of Ptolemy. The treatise of Pachymeres, by contrast, is never transmitted in the same codex with any of the ancient Greek musical authors.

Like Ptolemy's *Harmonica* and Aristides Quintilianus's *De musica*, Bryennius's treatise is arranged in three books, but his approach and content are distinct. He relies heavily on the Aristoxenian tradition in Book I, the Ptolemaic tradition in Book II, and a combination of Aristoxenian, Ptolemaic, and practical Byzantine traditions in Book III. The following outline shows the order and arrangement of the three books.

	Book I	**Book II**	**Book III**
1	Proem.	Concerning the fifteen harmonious ratios and the scales containing the consonances.	Concerning the order on the instrument and the constitution of the eight aforementioned tonoi.

---

[136] A *floruit* of twenty or thirty years later has also been proposed. The most thorough review of the evidence for Bryennius's life is presented by Jonker in his edition of the treatise (see chapter 2, n. 192 *supra*).

[137] For full descriptions, see Mathiesen, *RISM BXI*, **26**, **58**, **90**, **99**, **163**, **203**, **208**, **218**, **262**, and **263** (fourteenth century; three of these [**26**, **58**, and **99**] combine to form a complete version of the treatise); **2**, **103**, **107**, **160**, **198**, **230**, **256**, and **264** (fifteenth century); **3**, **11**, **17**, **30**, **33**, **37**, **39**, **44**, **50**, **55**, **62**, **65**, **77**, **81**, **84**, **85**, **86**, **89**, **91**, **92**, **93**, **98**, **128**, **131**, **138**, **151**, **154**, **179**, **189**, **226**, **232**, **233**, **235**, **259**, **271**, and **294** (sixteenth century); and **137**, **148**, **149**, **277**, and **278** (seventeenth century).

2	Concerning the fifteen strings of the so-called Immutable System and the tetrachords observed in it.	Concerning the antiphonic, paraphonic, consonant, dissonant, musical, and unmusical intervals.	Concerning the order on the instrument of the five tonoi, which Aristoxenus mentioned.
3	Concerning the two species of motion of the voice by position.	Concerning which strings of the fifteen-string instrument contain each of the eight principal and most familiar tonoi.	Concerning the names of musical and instrumental melos.
4	Concerning the note.	Concerning the magnitude of interval of the voice by which each of the eight tonoi is higher or lower.	Concerning the eight species of melody.
5	Concerning the interval.	Concerning the different appellations of the seven strings of the old-fashioned lyre.	Concerning Prolepsis and Prokrousis of the species of melody and an observation of the difference and commonality between them.
6	Concerning the scale.	Concerning the harmonic canon.	Concerning the mixing of the species of melody with one another.
7	Concerning the genus.	Concerning the division of the harmonic canon.	Concerning why in the other genera of melos the uppermost intervals are occupied by the largest of the three ratios required to complete the tetrachord, while in the Mild Entonic and the Intense Diatonic, these are not occupied by the largest but the intermediate ratios.
8	Concerning the tonos.	Concerning the division of the Equal Diatonic Genus.	Concerning scales with and without a pycnon.

9	Concerning modulation.	Concerning the division of the Intense Diatonic Genus.	Concerning the so-called synemmenon scale.
10		Concerning the division of the Mild Entonic Genus.	Concerning melic composition.
11		Concerning the division of the Mild Diatonic Genus.	Concerning the positions of the tetrachords, through which melos is defined.
12		Concerning the division of the Intense Chromatic Genus.	
13		Concerning the division of the Mild Chromatic Genus.	
14		Concerning the division of the Enharmonic Genus.	
15		Concerning the division of the Ditonal Genus.	

In writing his treatise, Bryennius did not copy or paraphrase a single source, nor did he compile a sequential series of sources, both methods employed by Boethius in his *De institutione musica*. Rather, he worked through the range of material available to him; compared different authors' treatments of similar subjects; adopted now one author's treatment, now another's; and attempted to enlarge and clarify obscure passages. More than any of the other Latin or Byzantine authors who turned their attention to the lost tradition of ancient Greek music theory, Bryennius functioned in a way that anticipated modern historical and text critical methods.

The three *codices musici* confidently placed in Constantinople during Bryennius's time—Vaticanus gr. 191, Vaticanus gr. 2338, and Venetus Marcianus gr. app. cl. VI/3—provide a clear example of Bryennius's use of sources. In his *Harmonica*, Book I, chapter 6, Bryennius includes a passage drawn from the treatise of Cleonides but omitting a number of words preserved in other, later versions of the text. In these three early manuscripts, however, a nearly identical omission appears. The text of Cleonides in Vaticanus gr. 191 and Venetus Marcianus gr. app. cl. VI/3 matches the version in Bryennius, with the exception of two extra words, while the treatise of Cleonides appears twice in Vaticanus gr. 2338: the first attributed to Cleonides (ff. 1r–3r), the second representing the "Pappus" version (ff. 10r–12v).[138] In the version attributed to Cleonides, a small space appears where some extra text was originally present, but this has been scratched out in the manuscript by the scribe; the text accordingly matches Bryennius's quotation exactly. The "Pappus" version in Vaticanus gr. 2338 contains the full text as it is known in later manuscripts, but here, the extra text that does not match the first version has been cancelled in the manuscript, thereby making both versions accord exactly with Byrennius's version. The following table provides an illustration of the relationship among these versions.

Cleonides (Solomon 138.23.18–22)	Bryennius 1.6 (Jonker 112.6–7)	Vaticanus gr. 191, f. 294r, and Venetus Marcianus gr. app. cl. VI/3, f. 7v	Vaticanus gr. 2338
ἔστι δὲ μέση, φθόγγου δύναμις ᾧ συμβέβηκε κατὰ μὲν διάζευξιν ἐπὶ μὲν τὸ ὀξὺ τόνον ἔχειν ἀσύνθετον ἀπαθοῦς ὄντος τοῦ συστήματος, ἐπὶ δὲ τὸ βαρὺ δίτονον ἤτοι σύνθετον ἢ ἀσύνθετον. κατὰ δὲ συναφὴν …	ἔστι δὲ μέση φθόγγου δύναμις, ᾧ συμβέβηκε κατὰ μὲν διάζευξιν ἐπὶ μὲν τὸ ὀξὺ τόνον ἔχειν ἀσύνθετον, κατὰ δὲ συναφὴν …	ἔστι δὲ μέση φθόγγου δύναμις ᾧ συμβέβηκε κατὰ μὲν διάζευξιν ἐπὶ μὲν τὸ ὀξὺ τόνον ἔχειν ἀσύνθετον ἢ ἀσύνθετον· κατὰ δὲ συναφὴν …	(f. 2v) ἔστι δὲ μέση φθόγγου δύναμις ᾧ συμβέβηκε κατὰ μὲν διάζευξιν ἐπὶ μὲν τὸ ὀξὺ τόνον ἔχειν ἀσύνθετον ⟨ca. 10 litt. *in ras.*⟩ κατὰ δὲ συναφὴν … (f. 12r) ἔστι δὲ μέση, φθόγγου δύναμις ᾧ συμβέβηκε κατὰ μὲν διάζευξιν ἐπὶ μὲν τὸ ὀξὺ τόνον ἔχειν ἀσύνθετον ~~ἀπαθοῦς ὄντος τοῦ συστήματος, ἐπὶ δὲ τὸ βαρὺ δίτονον ἤτοι σύνθετον ἢ ἀσύνθετον~~. κατὰ δὲ συναφὴν …

These three codices are the sole surviving exemplars of the treatise of Cleonides that are also sufficiently early for Bryennius to have had access to them, but neither Vaticanus gr. 191 nor Venetus Marcianus gr. app. cl. VI/3 contains the treatise of Gaudentius, a treatise clearly used by Bryennius as one of his sources. Vaticanus gr. 2338, however, includes not only the treatise of Gaudentius but also the treatises of Cleonides (in two versions) and Aristoxenus, the *Sectio canonis,* a series of excerpts titled *Musica* and attributed to Ptolemy,[139] and an excerpt from Theon of Smyrna's *Expositio.* Moreover, Vaticanus gr. 2338 includes copious marginal annotations that bear a strong affinity to the marginal annotations in Venetus Marcianus gr. app. cl. VI/3, pointing to the hand of the same annotator working on both these codices. The passage from Cleonides suggests that this annotator may well have been Bryennius himself and that these may be the very manuscripts used by Bryennius in writing his *Harmonica.*

---

[138] On these two versions, see pp. 367–68 *supra*.

While Bryennius certainly drew on Cleonides for technical material, he also relied heavily on the treatise of Aristides Quintilianus. This treatise is not fully represented in any of the three manuscripts associated with Bryennius, although a fragment does appear as one of the marginal texts in Venetus Marcianus gr. app. cl. VI/3. Two other thirteenth-century codices, however, Venetus Marcianus gr. app. cl. VI/10 and Vaticanus gr. 192, do contain the treatise in complete form. If these were also available to Bryennius, which is not unreasonable to suppose, he would have had available to him virtually the entire surviving corpus of ancient Greek music theory on which to base his own *Harmonica.*

At least forty-three passages in Bryennius's *Harmonica* exhibit nearly identical parallels to passages in Aristides Quintilianus's treatise, but there are many more in which Bryennius has adapted material from the earlier treatise, sometimes by condensing or expanding it, sometimes by combining it with material from other sources, and occasionally by changing a pagan to a Christian reference. Bryennius's Proem, for example, is largely a reworking of

---

[139] These were called the *Excerpta Neapolitana* by Karl von Jan in his *Musici scriptores graeci* because he encountered them in two manuscripts preserved in the Biblioteca Nazionale in Naples: Neapolitanus gr. 260 and 261 (Mathiesen, *RISM BXI,* 201–2), codices of the fifteenth or perhaps late fourteenth century. Their earliest appearance, however, is in Vaticanus gr. 2338. The *Excerpta* are clearly a Byzantine compilation, including passages drawn from the treatises of Cleonides, Nicomachus's *Manuale harmonicum* (see pp. 406–11 *supra*), Aristoxenus's *Elementa rhythmica* (see pp. 335–42 *supra*), and other unknown works representing Pythagorean, Aristoxenian, and Ptolemaic traditions.

Aristides Quintilianus's *De musica* 1.1–3, with the figure of Apollo now replaced by God himself. Likewise, his explanation for the inaudibility of the harmony of the spheres to mortals echoes Aristides Quintilianus's *De musica* 3.20:

Bryennius	Aristides Quintilianus
[Hermes invented the lyre in imitation of] the sounds that sound forth intellectually from the planets, through which, as an ancient story tells, a certain panharmonious and divine melos is woven together, which all cannot hear but only those who through a life of the highest good have purified the intellectual hearing of the soul. For the generative sounds of the divine bodies, as they say, are in nowise audible to mortal ears.[140]	These sounds are imperceptible to us ... but for the better of the superior beings who have lived among men, the sounds draw near hearing .... Unworthy men most especially are absolutely incapable of hearing the sound of the universe by accident, while serious and scientifically versed men—albeit rarely—do, in spite of all, partake abundantly of such honor and well being from the almighties.[141]

Later in Book I (chapter 7), Bryennius combines passages from the treatises of Pachymeres and Aristides Quintilianus to provide a fuller and more complete explanation of the genera, and in chapter 8, he attempts to clarify Aristides Quintilianus's complicated description (*De musica* 1.10) of the degree to which each tonos could be sung in full. His emendation of this passage is not fully convincing, but it does illustrate the extent to which Bryennius tried to comprehend and clarify his sources as he assembled them.[142]

The first seven chapters of Book II are based largely on Ptolemy's *Harmonica* (especially 1.7 and 2.5–10), while chapters 8–15, which are primarily devoted to a detailed but repetitive series of canonic divisions of the various genera, are derived either from Pachymeres's *Compendium* or a common earlier source.

---

[140] καὶ ἔτι τῶν νοερῶς ἐξ αὐτῶν ἐξηχουμένων ἤχων, δι' ὧν, ὡς ἀρχαῖός τις διάρρει λόγος, παναρμόνιόν τι καὶ θεῖον μέλος συνεξυφαίνεται, οὗ πάντες ἀκούειν οὐ δύναται, ἀλλὰ μόνοι ἐκεῖνοι, ὅσοι γε δὴ τὰς τῆς ψυχῆς νοερὰς ἀκοὰς δι' ἄκραν εὐζωΐαν ἐκάθηραν· οἱ γὰρ τῷ ὄντι γενεσιουργοὶ τῶν θείων σωμάτων, ὥς φασιν, ἦχοι ἐπικήροις ἀκοαῖς οὐδαμῶς ἀκουστοὶ καθεστήκασιν (Jonker 56.16–21).

[141] ἡμῖν μὲν οὖν ἀνεπαισθήτους γίνεσθαι τοὺς ἤχους ... τοῖς δὲ βελτίοσι τῶν μὴ φαύλως ἐν ἀνθρώποις βεβιωκότων ἐγγύς τε ἐλάσαι τῆς ἀκοῆς .... οὕτω δὲ καὶ τῆς τοῦ παντὸς ἠχῆς ἀκοῦσαι μὲν ἀπὸ ταὐτομάτου καὶ μάλιστα τοὺς ἀναξίους ἀμηχανώτατον, τοὺς δὲ σπουδαίους καὶ ἐπιστήμονας ἀφθόνως τῆς τοιαύτης τιμῆς τε καὶ εὐμοιρίας σπανίως μέν, ὅμως δ' οὖν μεταλαμβάνειν ὑπὸ τῶν κρειττόνων (W.-I. 120.8–24).

[142] A fuller discussion of these passages appears in Mathiesen, "Aristides Quintilianus and the *Harmonics* of Manuel Bryennius," 35–41.

Book III of Bryennius's *Harmonica* once again conflates, expands, and adapts passages from Ptolemy's *Harmonica* (especially 1.15 and 2.6 and 10–12) and Pachymeres's *Compendium*, but it also draws on the anonymous Byzantine collection of materials known as Bellermann's Anonymous. This collection, which seems to have been formed from three separate summaries of the practical and technical aspects of ancient Greek music and rhythmic theory, is preserved in complete form in eighteen manuscripts, the earliest of which is Venetus Marcianus gr. app. cl. VI/10; two manuscripts contain most of the treatise but omit the last part of the third anonymous; one contains just the first part of the third anonymous; three preserve only the short list of proportions of the consonant intervals (excluding the octave-and-a-fourth), which appears near the end of the third anonymous; two combine just the first few lines of the third anonymous with a short excerpt from *Manuale harmonicum* of Nicomachus; and two preserve fragments from the third anonymous in association with the Byzantine treatise *Hagiopolites*.[143]

The first anonymous provides descriptions of the rhythmic signs for the di-, tri-, tetra-, and pentasemes; the stigme; and eight melodic patterns: prolepsis, eklepsis, prokrousis, ekkrousis, ekkrousmos, kompismos, melismos, and teretismos. All this material is repeated as part of the third anonymous. The second anonymous defines music (and the musician), its various parts (theoretical, practical, and poetic) and subdivisions (harmonics, rhythmics, metrics, instruments, poetics, and theatrics), and the different genera in each of these subcategories, after which the treatise concentrates on the traditional seven Aristoxenian categories of harmonics. Much of this would seem to have been derived from Aristoxenus or Cleonides, Nicomachus (possibly including the second, larger treatise known to Boethius), and especially Aristides Quintilianus, but perhaps also drawn from such Latin sources as the treatises of Boethius, Cassiodorus, and Martianus Capella. The third anonymous, too, begins with definitions of music, perfect and instrumental melos, the parts of music and the primacy of harmonics, and the "position of the voice"; then, it treats the seven categories of harmonics, concluding with a series of miscellaneous sections on notation, the construction of the Perfect System and the names of the notes, the consonant intervals, solmisation, the range of the human voice, types of melodic patterns, various numbers defining the sizes of intervals, and material brought over from the first anonymous, many of these sections illustrated with notation providing musical examples. Once again, much of this relies heavily on Aristoxenus, Cleonides, Nicomachus, and Aristides Quintilianus, but virtually every other earlier Greek music theorist and perhaps several of the Latin writers seem to have been consulted as well.[144]

---

[143] "Bellermann's Anonymous" is so called after its first editor (see chapter 1, n. 8 *supra*). For descriptions of the complete versions, see Mathiesen, *RISM BXI*, **20, 36, 41, 87, 89, 95, 172, 181, 198, 200, 204, 219, 230, 238, 253, 255, 273,** and **284**; the nearly complete versions appear in **176** and **203**; the beginning of the third anonymous in **270**; the list of proportions in **14, 52,** and **250**; the beginning of the third anonymous in **114** and **228**; and the excerpts with the *Hagiopolites* in **299** and Parisinus gr. 360.

It is possible that the descriptions of the various melodic patterns preserved in Bellermann's Anonymous were actually derived from ancient sources, and in that case, they would certainly enlarge the rather limited descriptions of melic composition that appear in the earlier surviving sources. In Bryennius's *Harmonica,* however, they appear together with four additional patterns in conjunction with his discussion of the eight Byzantine *echoi* and their relationship to the eight Ptolemaic tonoi. Bryennius's description of the patterns (Book III, chapter 3) may be summarized as follows:

Prolepsis (πρόληψις)	an ascending line in vocal melos
Eklepsis (ἔκληψις)	a descending line in vocal melos
Prolemmatismos (προλημματισμός)	two repeated notes with a higher intervening note in vocal melos
Eklemmatismos (ἐκλημματισμός)	two repeated notes with a lower intervening note in vocal melos
Melismos (μελισμός)	use of a repeated notes on subsequent syllables in vocal melos

---

[144] For a fuller discussion of the sources used in Bellermann's Anonymous, see Najock, 192–206.

Prokrousis (πρόκρουσις)	in instrumental melos, equivalent to prolepsis
Ekkrousis (ἔκκρουσις)	in instrumental melos, equivalent to eklepsis
Prokrousmos (πρόκρουσις)	in instrumental melos, equivalent to prolemmatismos
Ekkrousmos (ἐκκρουσμός)	in instrumental melos, equivalent to eklemmatismos
Kompismos (κομπισμός)	in instrumental melos, equivalent to melismos
Teretismos (τερετισμός)	accompaniment of a vocal melos with parallel but lower instrumental pitches

Bryennius's description of the eight *echoi* (Book III, chapter 4) and their relationship to the Ptolemaic tonoi is based on a descending series of mesai that fall on various notes of the Perfect System. He essentially follows Ptolemy's system of "thetic" and "dynamic" nomenclature, though he never refers to it, preferring instead to employ references to the sequence of notes in the tetrachords of the upper and lower octaves of the Perfect System.[145] Bryennius's somewhat unwieldy descriptive process may be summarized as follows:

echos	Ptolemaic tonos	location of mese
First	Hypermixolydian	nete diezeugmenon
Second	Mixoydian	paranete diezeugmenon
Third	Lydian	trite diezeugmenon
Fourth	Phrygian	paramese
First Plagal	Dorian	mese
Second Plagal	Hypolydian	lichanos meson
Barus	Hypophrygian	parhypate meson
Fourth Plagal	Hypodorian	hypate meson

In fact, this sequence of mesai corresponds to Ptolemy's sequence, although Bryennius does not seem to envision the *echoi* as falling within Ptolemy's "characteristic octave" but rather as representing a series of overlapping octaves. If the voice extends above or below the limits of a particular *echos*, this constitutes a modulation into another *echos*. In chapters 5 and 6 of Book III, Bryennius briefly notes that Prolepsis and Prokrousis are used for the

---

[145] See pp. 459–64 *supra*.

enechemata (ἐνεχήματα), or the intonation formulas in Byzantine chant that indicate both the *echos* and the initial pitch,[146] and then turns to further observations about the common tetrachords shared by the various *echoi*, the types of melody as defined by their emphasis on the hypate or mese of a particular *echos*, and the ways in which modulation from one tonos to another.

In view of the context, it seems reasonable to assume that Bryennius recognized these materials as derived from the tradition of ecclesiastical chant rather than from any ancient source, although it is certainly possible he believed that the tradition of Byzantine chant was linked directly to the practice of antiquity. In any event, after this relatively extended discussion of musical practice, Bryennius returns to Ptolemy as his source for a treatment of the sizes of intervals in the various genera and the purpose of the synemmenon tetrachord, and then to Aristides Quintilianus and Cleonides for the traditional description of the parts of melic composition.[147] No attempt is made to relate this material to the melodic patterns described only a few chapters earlier. In the final chapter, Bryennius describes various ways of linking the tetrachords, perhaps drawing on the definitions provided by Bacchius[148] or some common source, and then concludes with a long quotation from Aristoxenus's *Elementa harmonica I* (I/B/2) emphasizing the importance of both a sharp aural sense and an acute intellect in order to fully understand the science of music.[149]

Although Bryennius certainly modelled the beginning of his *Harmonica* on Aristides Quintilianus's *De musica*, he did not try to adapt any of its grand final chapters in closing his treatise. Instead, with reference to the Aristoxenian seven categories of harmonics, he simply states: "Upon each of them, we have, with the help of God, expounded lucidly to the best of our ability in the previous chapters."[150]

---

[146] On this subject, see Oliver Strunk, "Intonations and Signatures of the Byzantine Modes," in *Essays on Music in the Byzantine World* (New York: Norton, 1977), 19–36.

[147] On Ptolemy's treatment of the synemmenon, see p. 462; on melic composition and its parts, see pp. 387–90, 531, and 537–38 *supra*.

[148] See pp. 589–92 *supra*.

[149] See pp. 321–22 *supra*.

[150] ὧν ἕκαστον ἐναργῶς σὺν θεῷ ἐν τοῖς ἔμπροσθεν ὡς οἷόν τε ἄρα γε ἦν ἡμῖν ἐξεθέμεθα (Jonker 374.29–30).

With Bryennius's modest statement, the tradition of ancient Greek music theory in the Middle Ages comes to a close. In a sense, Psellus, Pachymeres, and Bryennius already recognized that they were neither continuing nor preserving a venerated cultural tradition but rather rediscovering and resuscitating it for the purposes of imitation. But the tradition was now too remote from contemporary musical practice to sustain much interest in imitation, and it was challenged, particularly in the West, by a much more vital theoretical literature that addressed conceptual and practical problems in the music of the day.

Although the archaicizing tradition of such Byzantine writers as Pachymeres and Bryennius had come to an end, Byzantine scholarship by the fourteenth century had managed to preserve and organize a considerable quantity of writings on the subject of ancient Greek music and music theory, providing the basis for the modern historical study that would soon prove so influential and fascinating to the European Humanists. These texts now began to be edited, corrected, combined in various ways, and copied by scholar-scribes responding to new demands from readers in the East and increasingly in the West for early sources that would enable them to unravel for themselves the threads of an ancient tradition that had become hopelessly tangled in the conflicting testimony of the medieval Arabic, Latin, and Byzantine authors. Passing through the filter of Byzantine scholarship, the traditions of ancient Greek music history and music theory were gradually fixed and established in the more than two hundred *codices musici* produced in the fifteenth and sixteenth centuries.

The story of these codices and their readers extends beyond the scope of this book. It is a separate story better told elsewhere.[151] And, as it leads beyond the Middle Ages and into the Renaissance, our study draws to an end.

---

[151] Especially in N. G. Wilson, *From Byzantium to Italy: Greek Studies in the Italian Renaissance* (Baltimore, MD: Johns Hopkins University Press, 1992); and Palisca, *Humanism* (see chapter 5, n. 202 *supra*). For further information on the Greek scribes responsible for these manuscripts, see Mathiesen, "Hermes or Clio?"

Bibliography

Earlier bibliographic lists have appeared in Bursian's *Jahresbericht über die Fortschritte der classischen Altertumswissenschaft,* as follows:

Hermann Buchholtz, *Jahresbericht* 11 (1877): 1–33 (covering 1873–77)
W. Velke, *Jahresbericht* 15 (1878): 149–70 (covering 1877–78)
Heinrich Guhrauer, *Jahresbericht* 28 (1881): 168–82 (covering 1879–1880) and *Jahresbericht* 44 (1885): 1–35 (covering 1881–84)
Karl von Jan, *Jahresbericht* 104 (1901): 1–75 (covering 1884–99)
Ernst Graf, *Jahresbericht* 118 (1903): 212–35 (covering 1899–1902)
Hermann Abert, *Jahresbericht* 144 (1910): 1–74 (covering 1903–8) and *Jahresbericht* 193 (1923): 1–59 (covering 1909–21)
Karl Gustav Fellerer, *Jahresbericht* 246 (1935): 1–42 (covering 1921–31 and some later entries)

These reports were continued in Reginald P. Winnington-Ingram, "Ancient Greek Music 1932–57," *Lustrum* 3 (1958): 6–57, 259–60; and Annemarie Jeanette Neubecker, "Altgriechische Musik 1958–1986," *Lustrum* 32 (1990): 99–176. Additional pertinent items appeared in A. M. Dale, "Greek Metric 1936–57," *Lustrum* 2 (1957): 5–51.

Annual reports appear in *L'Année philologique: Bibliographie critique et analytique de l'antiquité greco-latine,* Collection de bibliographie classique publiée sous le patronage de l'Association Guillaume Budé (Paris: Les Belles Lettres, 1924/26–) and *RILM Abstracts* (New York: Répertoire International de Littérature Musicale, 1967–).

A comprehensive bibliography appeared some twenty-five years ago in my *Bibliography of Sources for the Study of Ancient Greek Music,* Music Indexes and Bibliographies, no. 10 (Hackensack, N.J.: Boonin, 1974), which contained 949 entries. Well over 600 new entries have been added to the following list, and corrections and annotations have been added to many items from my earlier bibliography.

The aim of this bibliography has not been to include every item that has ever appeared in an earlier list. The bibliography does aim, however, to provide a complete list of the works cited in this book and a relatively comprehensive list of works valuable for the study of ancient Greek music and music theory.

General reference is made here to dictionaries and encyclopedias such as the *New Grove Dictionary of Music and Musicians, Real-Enzyklopädie der klassischen Altertumswissenschaft, Oxford Classical Dictionary, Harvard Dictionary of Music, New Harvard Dictionary of Music, Die Musik in Geschichte und Gegenwart,* and others, which readers are of course urged to consult for separate articles on relevant subjects. With the exception of the main subject entry ("Greece," "Griechenland," "Grèce," etc.), however, these articles have not been included in the bibliography. Likewise, general histories and textbooks that treat ancient Greek music and music theory only in passing have not been included.

Publications dealing with metrics are included in the bibliography if they also treat the relationship between meter and music. Works that treat Greek metrics as an independent study separate from music or music theory are not included.

The bibliography is arranged alphabetically by author, and the works of each author are further arranged alphabetically by title. The only exception is in the case of ancient authors: here, the editions and translations are arranged chronologically. Cross-references have been provided for co-authored works, names of editors and translators, names included within titles of works, and alternative spellings of surnames.

In a very few cases, it was not possible to confirm the bibliographic reference; these items are marked with an asterisk.

A very few items added just as this book was going to press have been entered in the appropriate place in the alphabetical list and given an index number followed by a letter (e.g., 141a, 145a, 834a, 1205a, 1209a, and 1446a).

1 Aber, Adolf. "Die Musik im griechischen Drama." *Die Musik* 18 (1926): 495–501.

2 Abert, Hermann. "Das älteste Denkmal der christlichen Kirchenmusik." *Die Antike* 2 (1926): 282–90.

Reprinted in *Gesammelte Schriften und Vorträge,* hrsg. Friedrich Blume, 83–91. Halle: M. Niemeyer, 1929.

3 ———. "Antike." In *Handbuch der Musikgeschichte,* 2. Afl., hrsg. Guido Adler, 35–67. Berlin: M. Hesse, 1930; reprint, Tutzing: Hans Schneider, 1961.

4 ————. "Antike Musikerlegenden." In *Festschrift zum 90. Geburtstage Sr. Exz. des wirklichen geheimen Rates Rochus Freiherrn von Liliencron überreicht von Vertretern deutscher Musikwissenschaft,* 1–16. Leipzig: Breitkopf und Härtel, 1910.

5 ————. "Der gegenwärtige Stand der Forschung über die antike Musik." *Jahrbuch der Musikbibliothek Peters* 28, no. 2 (1922): 21–40.

"Festgabe zum siebzigsten Geburtstage Max Friedländers," hrsg. Rudolf Schwartz. Reprinted in *Gesammelte Schriften und Vorträge,* hrsg. Friedrich Blume, 35–58. Halle: M. Niemeyer, 1929.

6 ————. *Die Lehre vom Ethos in der griechischen Musik.* Leipzig: Breitkopf und Härtel, 1899; reprint, Tutzing: Hans Schneider, 1968. viii,168 p.

7 ————. "Die Musik der Griechen." In *Gesammelte Schriften und Vorträge,* hrsg. Friedrich Blume, 22–34. Halle: M. Niemeyer, 1929.

"Festvortrag zur Feier des 10jährigen Bestehens der 'Gesellschaft der Freunde antiker Kunst,' gehalten in der Preußischen Akademie der Wissenschaften am 24. November 1923, später auch in Hamburg und Dresden."

8 ————. "Musik und Politik im klassischen Altertum." *Neue Musikzeitung* 45 (1924): 3–7.

9 ————. *Die Musikanschauung des Mittelalters und ihre Grundlagen.* Halle: M. Niemeyer, 1905; reprint, Tutzing: Hans Schneider, 1964. vii,274 p.

10 ————. "Der neue Aristoxenosfund von Oxyrhynchos." *Sammelbände der Internationalen Musikgesellschaft* 1 (1899–1900): 333–40.

11 ————. "Der neue griechische Papyrus mit Musiknoten." *Archiv für Musikwissenschaft* 1 (1918–19): 313–28.

Reprinted in *Gesammelte Schriften und Vorträge,* hrsg. Friedrich Blume, 59–82. Halle: M. Niemeyer, 1929.

12 ————. "Ein neuentdeckter frühchristlicher Hymnus mit antiken Musiknoten." *Zeitschrift für Musikwissenschaft* 4 (1921–22): 524–29.

13 ————. "Ein neuer musikalischer Papyrusfund." *Zeitschrift der Internationalen Musikgesellschaft* 8 (1906–7): 79–83.

14 ————. "Die Stellung der Musik in der antiken Kultur." *Die Antike* 2 (1926): 136–54.

Reprinted in *Gesammelte Schriften und Vorträge,* hrsg. Friedrich Blume, 1–21. Halle: M. Niemeyer, 1929.

Абоносимова, И. See item 541.

Abraham, G. See item 1481.

15 Adams, S. M. "Salamis Symphony: The Persae of Aeschylus." *The Phoenix: Journal of the Classical Association of Canada* supp. vol. 1 (1952): 46–54.

"Studies in Honor of Gilbert Norwood."

Adler, Guido. See item 3.

Adorna, Francesco. See items 249, 946, and 1253.

16 Aeschylus. *Aeschylus.* 2 vols. Trans. Herbert Weir Smyth. Loeb Classical Library. Cambridge: Harvard University Press, 1922–26. xl,426 + 528 p.

————. See also items 15, 499, 600, 984, and 1343.

17 Ahl, Frederick. "Pindar and the Sphinx: Celtic Polyphony and Greek Music." In *Harmonia mundi: Musica e filosofia nell'antichità: Music and Philosophy in the Ancient World,* ed. Robert W. Wallace and Bonnie MacLachlan, 131–50. Biblioteca di Quaderni urbinati di cultura classica, vol. 5. Roma: Edizioni dell'Ateneo, 1991.

18 Ahlvers, Friedrich Arthur. *Zahl und Klang bei Platon.* Bern: P. Haupt, 1952. 67 p.

Alcman. See item 1027.

Alderman, Pauline. See item 936.

19 Alexanderson, Bengt. *Textual Remarks on Ptolemy's Harmonica and Porphyry's Commentary.* Studia graeca et latina Gothoburgensia, no. 27. Göteborg: Universitet, 1969. 24 p.

Distributed by Almqvist and Wiksell, Stockholm. Refers to items 1125 and 1150.

20 Allen, Thomas William; W. R. Halliday; and E. E. Sikes, eds. *The Homeric Hymns.* 2d ed. Oxford: Clarendon, 1936. cxv,471 p.

21 Allen, W. Sidney. *Accent and Rhythm: Prosodic Features of Latin and Greek: A Study in Theory and Reconstruction.* Cambridge Studies in Linguistics, vol. 12. Cambridge: Cambridge University Press, 1973. xiv,394 p.

22 Alypius. "'Αλυπίου εἰσαγωγὴ μουσική." In *Aristoxenus. Nicomachus. Alypius. Auctores musices antiquissimi, hactenus non editi,* Ioannes Meursius nunc primus vulgavit, et notas addidit, 93–124 and 186–[196]. Lugduni Batavorum, ex officinâ Ludovici Elzeviri, typis Godefridi Basson, 1616.

Reprinted with a Latin translation by Marcus Meibom in Ioannes Meursius, *Operum VI* (Florentiae, sacrae caesareae maiestatis typis, 1745), 473–528.

23 ————. "Excerpta ex Alypii introductione musica, cum Alypii tabula veterum notarum musicarum, edidit Athanas. Kircherus." In *Musurgia universalis,* lib. VII, erotema IV, 540–42. Romae, ex typographia hæredum Francisci Corbelletti, 1650.

24 ————. "Alypii Introductio musica, Marc. Meibomius restituit." In *Antiquae musicae auctores septem,* Marc. Meibomius restituit ac notis

explicavit. Amstelodami, apud Ludovicum Elzevirium, 1652; reprint in Monuments of Music and Music Literature in Facsimile, II/51, New York, Broude Brothers, 1977. 80 p.

Each of the first six treatises in the volume is separately paginated.

25 ————. "Alypi Isagoge." In *Musici scriptores graeci,* recog. Carolus Janus, 357–406. Leipzig: B. G. Teubner, 1895; reprint, Hildesheim: G. Olms, 1962.

26 ————. *Alypius et Gaudence.* Traduits en français pour la première fois. *Bacchius l'Ancien.* Traduction entièrement nouvelle. Commentaire perpétuel et tableaux de notation musicale par Charles-Emile Ruelle. Collection des auteurs grecs relatifs à la musique, no. 5. Paris: Firmin-Didot, 1895. xv,140 p.

27 ————. "Introduzione alla musica." In *La manualistica musicale greca,* ed. and trans. Luisa Zanoncelli, 371–463. Milan: Angelo Guerini, 1990.

The text follows Jan (item 723).

————. See also items 503, 747, 1269, and 1303.

28 Amano, Chikako. "Harmonia no tankyū—shokio Pythagoras-gakuha no ongaku-ron-kenkyū." M.A. dissertation, Tokyo University of Fine Arts and Music, 1973. 205 p.

29 Ambros, August Wilhelm. *Geschichte der Musik, mit zahlreichen Notenbeispielen und Musikbeilagen,* volume 1. Breslau: F. E. C. Leuckart, 1862. xx,548 p.

Greek music and music theory: pp. 1–339.

30 Amsel, Georg. "De vi atque indole rhythmorum quid veteres iudicaverint. Pars I." Ph.D. dissertation, Breslau, 1886. 53 p.

31 ————. *De vi atque indole rhythmorum quid veteres iudicaverint. Insunt Leopoldi Cohn et Guilelmi Studemund lectiones codicum ad scriptores de re metrica et de re musica pertinentes.* Breslauer philologische Untersuchungen, vol. I/3. Breslau: W. Koebner, 1887. 166 p.

§1: Ad Pseudo-Draconem de re metrica; §2: Ad Pseudo-Moschopulum de re metrica; §3: Ad enchiridii Hephaestionei epitomam; §4: Ad Aristidem Quintiliani libertum; §5: Ad Pseudo-Plutarchum de musica.

Amundsen, L. See item 452.

32 Anderson, Gene H. "Pythagoras and the Origin of Music." *Indiana Theory Review* 6, no. 3 (1983): 35–61.

Anderson, Gordon Athol. See item 537.

Anderson, J. K. See item 1367.

33 Anderson, Warren DeWitt. *Ethos and Education in Greek Music.* Cambridge: Harvard University Press, 1966. 306 p.

34 ————. "Hymns That Are Lords of the Lyre." *Classical Journal* 49 (1954): 211–15.

35 ———. "The Importance of Damonian Theory in Plato's Thought." *Transactions of the American Philological Association* 86 (1955): 88–102.

36 ———. *Music and Musicians in Ancient Greece.* Ithaca, NY: Cornell University Press, 1994. xiii,248 p.

37 ———. "Musical Development in the School of Aristotle." *Research Chronicle of the Royal Musical Association* 16 (1980): 78–98.

38 ———. "Paideia and Ethos in Hellenic Music, with Special Reference to Literary Evidence Regarding the Modes." Ph.D. dissertation, Harvard University, 1954. iii,645 p.

39 ———. "What Song the Sirens Sang: Problems and Conjectures in Ancient Greek Music." *Research Chronicle of the Royal Musical Association* 15 (1979): 1–16.

40 ———. "Word-Accent and Melody in Ancient Greek Musical Texts." *Journal of Music Theory* 17 (1973): 186–202.

41 Angeli, Andrea de. "La musica nel dramma greco." *Rivista di filologia* 22 (1894): 161–227.

42 Annibaldis, G., and O. Vox. "Il coro di Pirria." *Glotta* 55 (1977): 183–90.

43 Anticlo [Romualdo Giani]. "Gli spiriti della musica nella tragedia greca." *Rivista musicale italiana* 20 (1913): 821–87.

Apel, Willi. See item 632.

44 Arbatsky, Yuri *et al.* "Hellenic Influence in Folk Music of the Modern Balkans." *Athene* 16 (1955): 3–6, 17.

Archytas. See items 142, 234, 687, and 1503.

45 Aristides Quintilianus. "Aristidis Quintiliani De musica libri tres. Marcus Meibomius restituit ac notis explicavit." In *Antiquae musicae auctores septem,* Marc. Meibomius restituit ac notis explicavit, 2:1–164, 199–338. Amstelodami, apud Ludovicum Elzevirium, 1652; reprint in Monuments of Music and Music Literature in Facsimile, II/51, New York, Broude Brothers, 1977.

The treatise of Aristides Quintilianus begins a "second volume" with consecutive pagination. Each of the first six theorists in the publication has a separate pagination.

46 ———. *Aristidis Quintiliani De musica libri III.* Cum brevi annotatione de diagrammatis proprie sic dictis, figuris, scholiis, cet. codicum MSS. edidit Albertus Iahnius. Berlin: S. Calvarius, 1882. lxii,98 p. + 3 tables.

47 ———. *Aristeides Quintilianus von der Musik.* Eingeleitet, übersetzt und erläutert von Rudolf Schäfke. Berlin: M. Hesse, 1937. xii,366 p.

48 ———. *Aristidis Quintiliani De musica libri tres.* Edidit R. P. Winnington-Ingram. Leipzig: B. G. Teubner, 1963. xxix,198 p. + 4 tables.

49 ———. *Des Aristeides Quintilianus Harmonik.* Im Urtext wiederhergestellt und herausgegeben von Rudolf Schäfke. Tutzing: Hans Schneider, 1976. 69 p.

50 ———. *Aristides Quintilianus on Music in Three Books.* Translation, with Introduction, Commentary, and Annotations by Thomas J. Mathiesen. Music Theory Translation Series. New Haven, Conn.: Yale University Press, 1983. xiii,217 p.

51 ———. "The *De musica.*" In *Greek Musical Writings,* 2 vols., ed. Andrew Barker, 2:392–535. Cambridge Readings in the Literature of Music. Cambridge: Cambridge University Press, 1984–89.

———. See also items 31, 130, 230, 280, 282–85, 310, 361, 396–97, 443, 492, 529, 637, 679, 731, 929, 1131, 1258, 1270, 1380, 1408, 1457, 1499, 1572, 1596, and 1616.

52 Aristophanes. *Aristophanes.* 3 vols. Trans. Benjamin Bickley Rogers. Loeb Classical Library. Cambridge: Harvard University Press, 1924.

———. See also items 986, 1070, 1083, 1138, 1322, and 1620.

53 Aristotle. *Aristotelis opera.* Ed. Immanuel Bekker. Berlin: Reimer, 1831. ii,1462.

54 ———. *Problèmes musicaux d'Aristote.* Traduction française avec commentaire perpétuel par Charles-Emile Ruelle. Collection des auteurs grecs relatifs à la musique, no. 4. Paris: Firmin-Didot, 1891. 35 p.
=*Revue des études grecques* 4 (1891): 233–67, 483.

55 ———. "Loci de musica." In *Musici scriptores graeci,* recog. Carolus Janus, 1–111. Leipzig: B. G. Teubner, 1895; reprint, Hildesheim: G. Olms, 1962.

56 ———. *Problèmes musicaux d'Aristote.* Texte grec avec traduction française, notes philologiques, commentaire musical et appendice par François A. Gevaert et J. C. Vollgraff. Gand: Ad. Hoste, 1903; reprint, Osnabrück: Biblio, 1977. xx,421 p.

57 ———. Butcher, S. H. *Aristotle's Theory of Poetry and Fine Art, with a Critical Text and Translation of the Poetics.* 4th ed. London: Macmillan, 1911; reprint, New York: Dover, 1951. lxxvi,421 p.

58 ———. *Aristotelis quae feruntur Problemata physica.* Edidit Carolus Aemilius Ruelle, recognovit H. Knoellinger, editionem post utriusque mortem curavit praefatione ornavit Josephus Klek. Leipzig: B. G. Teubner, 1922. xv,317 p.

59 ———. *Aristotle in Twenty-Three Volumes.* Volume 15, *Problems, Books I–XXI.* With an English translation by W. S. Hett. Loeb Classical Library. Cambridge: Harvard University Press, 1926. xiv,461 p.

60 ———. *The Works of Aristotle Translated into English,* ed. W. D. Ross. Volume 7, *Problemata,* trans. E. S. Forster. Oxford: Clarendon, 1927.

61 ———. *Aristotle in Twenty-Three Volumes.* Volume 14, *Minor Works.* With an English translation by W. S. Hett. Loeb Classical Library. Cambridge: Harvard University Press, 1936. viii,516 p.

62 ———. *Problemi musicali.* Traduzione dal greco con testo a fronte a cura di Gerardo Marenghi. Il Melagrano. Scritti vari e rappresenta-

tivi di poesia e pensiero in versioni d'arte con testo a fronte, vols. 194–95. Firenze: Sansoni, 1957. 143 p.

63 ————. "The Aristotelian *Problemata*." In *Greek Musical Writings*, 2 vols., ed. Andrew Barker, 2:85–97. Cambridge Readings in the Literature of Music. Cambridge: Cambridge University Press, 1984–89.

64 ————. "The Aristotelian *Problems*." In *Greek Musical Writings*, 2 vols., ed. Andrew Barker, 1:190–204. Cambridge Readings in the Literature of Music. Cambridge: Cambridge University Press, 1984–89.

————. See also items 37, 65, 131–32, 174, 196, 214, 220, 242, 246, 277, 309, 370, 379, 395, 441, 515, 568, 734, 757, 788, 863–64, 873, 950, 955, 965, 1173, 1192, 1209, 1219, 1225, 1357, 1404, 1447, 1449, 1480, and 1535.

65 Aristoxenus. *Aristoxeni musici antiquiss. Harmonicorum elementorum libri III. Cl. Ptolomaei Harmonicorum, seu de musica libri III. Aristotelis de obiecto auditus fragmentum ex Porphyrij commentarijs.* Omnia nunc primum latine conscripta et edita ab Ant. Gogauino Grauiensi. Cum privilegiis. Venetijs, apud Vincentium Valgrisium, 1562. 165 p.

Aristoxenus reprinted in Rudolf Westphal, *Aristoxenos von Tarent*. See item 78.

66 ————. Bottrigari, Erc[ole]. *Il Patricio, ovvero de' tetracordi armonici di Aristosseno*. Bologna: V. Benacci, 1593; reprint in Bibliotheca musica bononiensis, II/27, Bologna: Forni, 1969. 47 p.

67 ————. "'Αριστοξένου ἀρμονικῶν στοιχείων βιβλία γ'." In *Aristoxenus. Nicomachus. Alypius. Auctores musices antiquissimi, hactenus non editi,* Ioannes Meursius nunc primus vulgavit, et notas addidit, 1–59. Lugduni Batavorum, ex officinâ Ludovici Elzeviri, typis Godefridi Basson, 1616.

Reprinted with a Latin translation by Marcus Meibom in Ioannes Meursius, *Operum VI* (Florentiae, sacrae caesareae maiestatis typis, 1745), 343–422.

68 ————. "Aristoxeni harmonicorum elementorum libri tres. Marc. Meibomius vertit, ac notis explicavit." In *Antiquae musicae auctores septem,* Marc. Meibomius restituit ac notis explicavit. Amstelodami, apud Ludovicum Elzevirium, 1652; reprint in Monuments of Music and Music Literature in Facsimile, II/51, New York, Broude Brothers, 1977. 132 p.

Each of the first six treatises in the volume is separately paginated.

69 ————. "'Αριστοξένου ῥυθμικῶν στοιχεὶων Β." In *Aristidis oratio adversus Leptinem, Libonii declamatio pro Socrate, Aristoxenii rhythmicorum elementorum fragmenta ex bibliotheca Veneta d. Marci,* ed. Jac. Morellius, 266–305. Venetiis, typis Caroli Palevii, 1785.

This volume printed in facing pages with Greek on the versos and Latin on the rectos.

70 ———. Mahne, Gulielmus Leonardus. *Diatribe de Aristoxeno, philosopho peripatetico.* Amstelodami, typis P. den Hengst, 1793. 220 p.

71 ———. "The First Book of the Elements of Harmony by Aristoxenus." Trans. by John Callcott [1797]. London, British Library, Additional 27647, ff. 2–6.

72 ———. *Luzac, Joannes. "De Aristoxeno, philosopho peripat." In *Lectiones atticae,* edidit Janus Otto Sluiter. Lugduni Batavorum, Weidmann [Leipzig], 1809.

73 ———. *Grundzüge der Rhythmik, ein Bruchstück, in berichtigter Urschrift mit deutscher Übersetzung.* Neu hrsg. von Heinrich Feussner. Hanau: C. F. Edler, 1840. xii,67 p.

74 ———. *Aristoxeni elementorum rhythmicorum fragmentum.* Post Morellium et Feussnerum recensuit et explicavit I. Bartels. Bonn: A. Matz, 1854. 56 p.

75 ———. "De Aristoxeni Tarentini elementis harmonicis, edidit Paulus Marquard." Ph.D. dissertation, Bonn, 1863. 36 p.

76 ———. Marquard, Paul, ed. *Ἀριστοξένου ἀρμονικῶν τὰ σωζόμενα. Die harmonischen Fragmente des Aristoxenus. Griechisch und deutsch mit kritischem und exegetischem Kommentar und einem Anhange, die rhythmischen Fragmente des Aristoxenus enthaltend.* Berlin: Weidmann, 1868. xxxvii,415 p.

77 ———. *Éléments harmoniques d'Aristoxène.* Traduits en français pour la première fois d'après un texte revu sur les sept manuscrits de la Bibliothèque Nationale et sur celui de Strasbourg par Charles-Emile Ruelle. Collection des auteurs grecs relatifs à la musique, no. 1. Paris: Pottier de la Laine, 1871. xx,128 p. + 5 plates.

78 ———. *Aristoxenos von Tarent, Melik und Rhythmik des classischen Hellenentums.* 2 vols. Übersetzt und erläutert von Rudolf Westphal. Leipzig: A. Abel, 1883, 1893; reprint, Hildesheim: G. Olms, 1965. lxxiv,508 + 16,ccxl,31,110 p.

79 ———. *Gli elementi ritmici di Aristosseno.* Tradotti ed illustrati da Paolo Segato. Feltre: Panfilo Castaldi, 1897. vi,58 p.

80 ———. "IX. Aristoxenus ΡΥΘΜΙΚΑ ϹΤΟΙΧΕΙΑ." *Oxyrhynchus Papyri* 1 (1898): 14–21 and plate III.

See items 87, 529, 801, 1160, and 1253.

81 ———. *The Harmonics of Aristoxenus.* Edited with translation, notes, introduction, and index of words by Henry S. Macran. Oxford: Clarendon, 1902; reprint, Hildesheim: G. Olms, 1974. 303 p.

82 ———. "667. Aristoxenus?" *Oxyrhynchus Papyri* 4 (1904): 86–90.

83 ———. Laloy, Louis. *Aristoxène de Tarente, disciple d'Aristote, et la musique de l'antiquité.* Paris: Société française d'imprimerie et de librairie, 1904; reprint, Genève: Minkoff, 1973. xlii,371 p.

84 ———. *Aristoxeni elementa harmonica.* Rosetta Da Rios recensuit. Romae, typis publicae officinae polygraphicae, 1954. cxvii, 189,131 p.

85 ———. *Aristoxeni Rhythmica: Elem. rhythm., Psell., Exc. Neap. (R. Westphal 1867), POxy 9 (Grenfell, Hunt, Blass 1898).* Con traduzione di G. B. Pighi. Letteratura greca. Bologna: Riccardo Pàtron, 1959. 68 p.

Photographic reprints of Greek texts as noted in the title, together with Pighi's translations and notes in typescript.

86 ———. Wehrli, Fritz, ed. *Aristoxenos.* Die Schule des Aristoteles, vol. 2. Basel: Schwabe, 1967. 87 p.

87 ———. "2687. Aristoxenus, Ῥυθμικὰ Ϲτοιχεῖα?" *Oxyrhynchus Papyri* 49 (1968): 15–25 and plate II.

See also items 80, 529, 801, 1160, and 1253.

88 ———. Rowell, Lewis. "Aristoxenus on Rhythm." *Journal of Music Theory* 23 (1979): 63–79.

89 ———. "*Elementa harmonica.*" In *Greek Musical Writings,* 2 vols., ed. Andrew Barker, 2:119–84. Cambridge Readings in the Literature of Music. Cambridge: Cambridge University Press, 1984–89.

90 ———. "*Elementa Rhythmica.*" In *Greek Musical Writings,* 2 vols., ed. Andrew Barker, 2:185–89. Cambridge Readings in the Literature of Music. Cambridge: Cambridge University Press, 1984–89.

91 ———. *Elementa rhythmica: The Fragment of Book II and the Additional Evidence for Aristoxenian Rhythmic Theory.* Edited with introduction, translation, and commentary by Lionel Pearson. Oxford: Clarendon, 1990. liv,98 p.

———. See also items 10, 132–33, 138, 141, 161, 174, 182, 188, 281, 295, 335, 366, 660, 707, 716–17, 721, 726, 764–65, 771, 801–2, 816, 824, 853, 862, 1120, 1130, 1173, 1189, 1208, 1250, 1262, 1267, 1271–72, 1318, 1331, 1440, 1454, 1464, 1467, 1563, 1584, and 1595.

92 Arnim, Heinrich von. *Stoicorum veterum fragmenta.* 3 vols. Leipzig: B. G. Teubner, 1905. 1,142 + vi,348 + iv,279 p.

93 Arnoux, Georges. *Musique platonicienne, âme du monde.* Paris: Dervey, 1960. 295 p.

Arrighetti, G. See item 1307.

94 Arteaga, Esteban de. *I. Lettere musico-filologiche. II. Del ritmo sonoro e del ritmo muto nella musica degli antichi.* Madrid: Mossen Alcover, 1944. cxlix,297 p.

95 Athanassakis, Apostolos N. "Music and Ritual in Primitive Eleusis." *Platon* 28 (1976): 86–105.

96 Athenaeus. *Athenaei Naucratitae Dipnosophistarum libri XV.* 3 vols. Rec. Georgius Kaibel. Leipzig: B. G. Teubner, 1887–90; reprint, Stuttgart: B. G. Teubner, 1965–66. xli,491 + iv,498 + xii,810 p.

97 ———. *Deipnosophistae.* 7 vols. Edited and translated by Charles Burton Gulick. Loeb Classical Library. Cambridge: Harvard University Press, 1950. xxii,484 + viii,533 + viii,510 + x,606 + xi,550 + xi,548 + xiii,581 p.

———. See also item 116 and 1202.

98 Auda, Antoine. *Les gammes musicales. Essai historique sur les modes et sur les tons de la musique depuis l'antiquité jusqu'à l'époque moderne.* Woluwé-St.-Pierre: Édition nationale belge, 1947. xxxi,393 p.

99 ————. *Les modes et les tons de la musique et spécialement de la musique médiévale.* Brussels: Académie royale de belgique, 1930. 203 p.

100 ————. "Contribution à l'histoire de l'origine des modes et des tons grégoriens." *Revue du chant grégorièn* 36 (1932): 33, 72, 105, 130.

101 Augustine, Aurelius, Saint. "Sancti Aurelii Augustini Hipponensis Episcopi de musica libri sex." In *Patrologia cursus completus, series latina,* ed. J. P. Migne, 32:1081–1194. 221 vols. Paris: Garnier, 1844–1904.

102 ————. *Aurelii Augustini de musica.* Ed. and trans. Giovanni Marzi. Collana di classici della filosofia cristiana, no. 1. Florence: Sansoni, 1969. 687 p.

————. See also items 502, 913, and 1422.

103 Avison, Charles. *An Essay on musical expression by Charles Avison. With alterations and large additions. To which is added, A letter to the author concerning the music of the ancients, and some passages in classic writers, relating to that subject* [by J. Jortin]. *Likewise, Mr. Avison's Reply to the author of Remarks on the Essay on musical expression. In a letter from Mr. Avison to his friend in London.* 3d ed. London: Printed for L. Davis, 1775. viii,221 p.

Babbitt, Frank C. See item 1102.

104 Bacchius. "Bacchii senioris introductio method. ad musicam, sive harmonica et rhythmica elementa, graece, e cod. ms. edidit Marius Mersennus." In *Quaestiones celeberrimae in Genesim, cum accurata textus explicatione; in hoc volumine athei et deistae impugnantur et expugnantur, et Vulgata editio ab haereticorum calumniis vindicatur, Graecorum et Hebraeorum musica instauratur ...,* cols. 1887–91. Lutetiae Parisiorum, sumptibus S. Cramoisy, 1623.

In addition to the text of Bacchius's treatise, there are several other articles relevant to ancient Greek music: Quaestio 56–57 (cols. 1515–30); Articles I–III (cols. 1530–64), VI (cols. 1571–78), and IX–XVII (cols. 1607–1712b); and Paralipomena to Quaestio 56–57 (cols. 1853–1916).

105 ————. *Bacchii senioris iatromathemathici εἰσαγώγη sive introductio methodica ad musicam per dialogismum.* Graece nunc primum e bibliotheca regia eruta. Fredericus Morellius recensuit, castigavit, latine vertit, et notis illustravit. Lutetiae, apud F. Morellius, 1623. 24 p.

106 ————. "Introduction à la musique composée par Bacchius Autheur Grec." In *Traité de l'harmonie universelle, où est contenu la musique theorique et pratique des anciens et modernes, avec les causes de ses effets, Enrichie de raisons prises de la philosophie, et de mathematiques,* by Marin Mersenne, 93–106. Paris: Guillaume Baudry, 1627.

107 ———. "Bacchii senioris introductio artis musicae. Marc. Meibomium primus Latine vertit, ac notis illustravit." In *Antiquae musicae auctores septem*, Marc. Meibomius restituit ac notis explicavit. Amstelodami, apud Ludovicum Elzevirium, 1652; reprint in Monuments of Music and Music Literature in Facsimile, II/51, New York, Broude Brothers, 1977. 36 p.

Each of the first six treatises in the volume is separately paginated.

108 ———. *Die Eisagoge des Bacchius.* I. Text, kritischer Apparat und deutsche Übersetzung, von Oberlehrer Professor Dr. K. Von Jan. Lyceum zu Strassburg i. E., Beilage zum Programm für das Schuljahr 1889–1890. Strassburg: Strassburger Druckerei und Verlagsanstalt, 1890. 32 p.

109 ———. *Die Eisagoge des Bacchius.* II. Erklärung, von Oberlehrer Professor Dr. K. Von Jan. Lyceum zu Strassburg i. E., Beilage zum Programm für das Schuljahr 1890–1891. Strassburg: Strassburger Druckerei und Verlagsanstalt, 1891. 23 p.

110 ———. "Bacchii gerontis isagoge." In *Musici scriptores graeci*, recog. Carolus Janus, 283–316. Leipzig: B. G. Teubner, 1895; reprint, Hildesheim: G. Olms, 1962.

111 ———. Steinmayer, Otto. "Bacchius Geron's *Introduction to the Art of Music*." *Journal of Music Theory* 29 (1985): 271–98.

112 ———. "Introduzione all' arte musicale." In *La manualistica musicale greca*, ed. and trans. Luisa Zanoncelli, 245–304. Milan: Angelo Guerini, 1990.

The text follows Jan (item 723).

———. See also items 26, 420, 722, 771, and 1379.

113 Backus, John. *The Acoustical Foundations of Music.* New York: Norton, 1969. xiv,312 p.

114 Bähr, Otto. *Das Tonsystem unserer Musik. Nebst einer Darstellung der griechischen Tonarten und der Kirchentonarten des Mittelalters.* Leipzig: F. A. Brockhaus, 1882. viii,269 p.

115 Bake, Arnold. "The Music of India." In *Ancient and Oriental Music*, ed. Egon Wellesz, 195–227. New Oxford History of Music, vol. 1. London: Oxford University Press, 1957.

Baker, Nancy K. See items 883 and 933.

Baker, Thomas W. See item 1151.

116 Bapp, Carolus Albertus. *De fontibus quibus Athenaeus in rebus musicis lyricisque enarrandis usus sit.* Leipzig: J. B. Hirschfeld, 1885. 45 p.

Barber, E. A. See item 974.

117 Barbera, André. "Arithmetric and Geometric Divisions of the Tetrachord." *Journal of Music Theory* 21 (1977): 294–323.

118 ———. "The Consonant Eleventh and the Expansion of the Musical Tetraktys." *Journal of Music Theory* 28 (1984): 191–224.

119 ————. *The Euclidean Division of the Canon: Greek and Latin Sources.* Greek and Latin Music Theory, vol. 8. Lincoln: University of Nebraska Press, 1991.

120 ————. "Greece." In *New Harvard Dictionary of Music,* ed. Don Michael Randel, 346–51. Cambridge: Belknap Press of Harvard University Press, 1986.
Cf. item 632.

121 ————. "Interpreting an Arithmetical Error in Boethius's *De institutione musica* (iii.14–16)." *Archives internationales d'histoire des sciences* 31 (1981): 26–41.

122 ————. "New and Revived Approaches to Text Criticism in Early Music Theory." *Journal of Musicology* 9 (1991): 57–73.

123 ————. "Octave Species." *Journal of Musicology* 3 (1984): 229–41.

124 ————. "The Persistence of Pythagorean Mathematics in Ancient Musical Thought." Ph.D. dissertation, University of North Carolina–Chapel Hill, 1980. x,360 p.

125 ————. "Placing *Sectio canonis* in Historical and Philosophical Contexts." *Journal of Hellenic Studies* 104 (1984): 157–61.
Response to item 139.

126 ————. "Reconstructing Lost Byzantine Sources for MSS Vat. BAV gr. 2338 and Ven. BNM gr. VI.3: What Is an Ancient Treatise?" In *Music Theory and Its Sources: Antiquity and the Middle Ages,* ed. André Barbera, 38–67. Notre Dame, Ind.: Notre Dame University Press, 1990.

127 ————. "*Republic* 530C–531C: Another Look at Plato and the Pythagoreans." *American Journal of Philology* 102 (1981): 395–410.

128 ————, ed. *Music Theory and Its Sources: Antiquity and the Middle Ages.* Notre Dame Conferences in Medieval Studies, vol. 1. Notre Dame, Ind.: Notre Dame University Press, 1990. xiv,319 p.

————. See also items 515, 689, 930, 1056, and 1383.

129 Barbour, J. Murray. "The Principles of Greek Notation." *Journal of the American Musicological Society* 13 (1960): 1–17.

————. See also item 821.

Bardi, Giovanni. See item 1031.

130 Barker, Andrew. "Aristides Quintilianus and Constructions in Early Music Theory." *Classical Quarterly* n.s. 32 (1982): 184–97.

131 ————. "Aristotle on Perception and Ratios." *Phronesis* 26 (1981): 248–66.

132 ————. "Aristoxenus' Harmonics and Aristotle's Theory of Science." In *Science and Philosophy in Classical Greece,* ed. A. C. Bowen, 188–226. Sources and Studies in the History and Philosophy of Classical Science, vol. 2. New York: Garland, 1991.

133 ————. "Aristoxenus' Theorems and the Foundations of Harmonic Science." *Ancient Philosophy* 4 (1984): 23–64.

134 ————. "Che cos' era la «mágadis»?" In *La musica in Grecia*, ed. Bruno Gentili and Roberto Pretagostini, 96–107. Storia e società. Roma-Bari: Laterza, 1988.

135 ————. *Greek Musical Writings.* 2 vols. Cambridge Readings in the Literature of Music. Cambridge: Cambridge University Press, 1984–89. xiv,332 + viii,581 p.

136 ————. "*Heterophonia* and *Poikilia*: Accompaniments to Greek Melody." In *Mousike: Metrica, ritmica e musica greca in memoria di Giovanni Comotti*, ed. Bruno Gentili and Franca Perusino, 41–60. Pisa: Istituti editoriali e poligrafici internazionali, 1995.

137 ————. "Innovations of Lysander the Kitharist." *Classical Quarterly* n.s. 32 (1982): 266–69.

138 ————. "῾ΟΙ ΚΑΛΟΥΜΕΝΟΙ ῾ΑΡΜΟΝΙΚΟΙ: The Predecessors of Aristoxenus." *Proceedings of the Cambridge Philological Society* 24 (1978): 1–21.

139 ————. "Methods and Aims in the Euclidean *Sectio canonis.*" *Journal of Hellenic Studies* 101 (1981): 1–16.

See response in item 125.

140 ————. "Music and Mathematics: Theophrastus against the Number-Theorists." *Proceedings of the Cambridge Philological Society* 23 (1977): 1–15.

141 ————. "Music and Perception: A Study in Aristoxenus." *Journal of Hellenic Studies* 98 (1978): 9–16.

141a ————. "An Oxyrhynchus Fragment on Harmonic Theory." *Classical Quarterly* 44 (1994): 75–84.

142 ————. "Ptolemy's Pythagoreans, Archytas, and Plato's Conception of Mathematics." *Phronesis* 39 (1994): 113–35.

143 ————. "Reason and Perception in Ptolemy's *Harmonics.*" In *Harmonia mundi: Musica e filosofia nell'antichità: Music and Philosophy in the Ancient World*, ed. Robert W. Wallace and Bonnie MacLachlan, 104–30. Biblioteca di Quaderni urbinati di cultura classica, vol. 5. Roma: Edizioni dell'Ateneo, 1991.

144 ————. "ΣΥΜΦΩΝΟΙ ’ΑΡΙΘΜΟΙ: A Note on *Republic* 531C1–4." *Classical Philology* 73 (1978): 337–42.

145 ————. "Theophrastus on Pitch and Melody." In *Theophrastus of Eresus*, ed. W. Fortenbaugh *et al.*, 289–324. New Brunswick: Transaction Books, 1985.

145a ————. "Three Approaches to Canonic Division." *Apeiron* 24 (1991): 49–83.

146 ————. "Text and Sense at *Philebus* 56a." *Classical Quarterly* n. s. 37 (1987): 103–9.

————. See also items 51, 63–64, 89–90, 477, 1014, and 1152.

147 Barry, Phillips. "Greek Music." *Musical Quarterly* 5 (1919): 578–613.

Bartels, I. See item 74.

148 Barthélemy, Jean-Jacques. *Entretiens sur l'état de la musique grecque, vers le milieu du quatrième siècle, avant l'Ère vulgaire.* Amsterdam: De Bure, 1777. 111 p.

149 Bartholinus, Caspar. *De tibiis veterum et earum antiquo usu libri tres.* Amstelodami, Wetstenium, 1679. 415 p.

150 Bassi, Domenico. "Frammenti inediti di opere de Filodemo (περὶ μουσικῆς, περὶ θεῶν, περὶ ῥητορικῆς) in papiri Ercolanesi." *Rivista di filologia* 38 (1910): 323–26.

151 Bataille, André. "Remarques sur les deux notations mélodiques de l'ancienne musique grecque." *Recherches de papyrologie* 1 (1961): 5–20.

152 Batka, Richard. *Die Musik der alten Griechen: Ein Vortrag.* Prag: By the author, 1900. 18 p.

153 Baud-Bovy, Samuel. "La canzone popolare della Grecia moderna e la musica antica." In *La musica in Grecia,* ed. Bruno Gentili and Roberto Pretagostini, 219–27. Storia e società. Roma-Bari: Laterza, 1988.

154 ————. "Chansons populaires de la Grèce ancienne." *Revue de musicologie* 69 (1983): 5–20.

See also "Corrigenda" in *Revue de musicologie* 70 (1984): 259–60.

155 ————. "Le dorien était-il un mode pentatonique?" *Revue de musicologie* 64 (1978): 153–80.

156 ————. "Métrique antique et chanson populaire." *Revue des études grecques* 100 (1987): 45–57.

157 Baudot, Alain. *Musiciens romaine de l'antiquité.* Montréal: Presses de l'Université de Montréal, 1973. 158 p.

158 Beaton, Roderick. "Modes and Roads: Factors of Change and Continuity in Greek Musical Tradition." *The Annual of the British School at Athens* 75 (1980): 1–11.

159 Beazley, John Davidson. "Hydria-Fragments in Corinth." *Hesperia* 24 (1955): 305–19.

160 ————. "Hymn to Hermes." *American Journal of Archaeology* 52 (1948): 336–40.

Bechtel, Fritz. See item 343.

161 Becker, Heinz. "Syrinx bei Aristoxenos." In *Musa-Mens-Musici. Im Gedenken an Walther Vetter,* hrsg. Heinz Wegener, 23–26. Leipzig: VEB Deutscher Verlag für Musik, 1969.

162 ————. *Zur Entwicklungsgeschichte der antiken und mittelalterlichen Rohrblattinstrumente.* Schriftenreihe des Musikwissenschaftlichen Instituts der Universität Hamburg, vol. 4. Hamburg: Sikorski, 1966. 187 p.

————. See also item 650.

163 Becker, Oskar. "Frühgriechische Mathematik und Musiklehre." *Archiv für Musikwissenschaft* 14 (1957): 156–64.

164 Beger, August. *Die Würde der Musik im griechischen Alterthume zur Beachtung für die Gegenwart.* Dresden: Arnold, 1839. 119 p.

165 Behagel, G. *Die erhaltenen Reste altgriechischer Musik.* Programm des Grossherzoglichen Lyceums zu Heidelberg, September 16–19, 1844. Heidelberg: G. Reichard, 1844. 12 p.

166 Behn, Friedrich. "Die Laute im Altertum und frühen Mittelalter." *Zeitschrift für Musikwissenschaft* 1 (1918–19): 89–107.

167 ————. *Die Musik des Altertums.* Kulturgeschichtliche Wegweiser durch das römische-germanische Zentralmuseum, no. 7. Mainz: Wilcken, 1925.

168 ————. *Musikleben im Altertum und frühen Mittelalter.* Stuttgart: Hiersemann, 1954. xxiv,180 p.

169 Bekker, Immanuel, ed. *Suidae lexicon.* Berlin: Reimer, 1854. 1158 p.

————. See also items 53, 1067, 1121, and 1351.

170 Bekker, Paul. *Musikgeschichte als Geschichte der musikalischen Formwandlungen.* Berlin: Deutsche Verlags-Anstalt, 1926. v,237 p.

171 Bélis, Annie. "À propos de la construction de la lyre." *Bulletin de correspondance hellénique* 109 (1985): 201–20.

172 ————. "A proposito degli «Inni delfici»." In *La musica in Grecia,* ed. Bruno Gentili and Roberto Pretagostini, 205–18. Storia e società. Roma-Bari: Laterza, 1988.

173 ————. "*Anthologie* XI, 78: Fourmillements musicaux sur la tête d'un boxeur." *Études classiques* 58 (1990): 115–28.

174 ————. *Aristoxène de Tarente et Aristote: Le Traité d'harmonique.* Études et Commentaires, 100. Paris: Klincksieck, 1986. 274 p.

175 ————. "L'ἀρχή dans le système musical des Grecs." *Revue des archéologues et historiens d'art de Louvain* 17 (1984): 16–29.

176 ————. "Auloi grecs du Louvre." *Bulletin de correspondance hellénique* 108 (1984): 111–22.

177 ————. "L'Aulos phrygien." *Revue archéologique* 48 (1986): 21–40.

178 ————. *Les deux hymnes delphiques à Apollon: Étude épigraphique et musicale.* Corpus des inscriptions de Delphes, vol. 3. Paris: de Boccard, 1992. 188 p. + 10 plates.

179 ————. "Fragments d'auloi." In *L'Antre corycien II,* 176–81. Bulletin de correspondance hellénique, supplément 9. Paris: Boccard, 1984

180 ————. "ΚΡΟΥΠΕΖΑΙ, Scabellum." *Bulletin de Correspondance hellénique* 112 (1988): 323–39.

181 ————. "La musica Greca antica: Convegno internazionale di studi, Urbino (18–20 Octobre 1985)." *Revue archéologique,* 1986, 401–3.

182 ————. "Les nuances dans le *Traité harmonique* d'Aristoxène de Tarente." *Revue des études grecques* 95 (1982): 54–73.

183 ————. "Un nouveau document musical." *Bulletin de correspondance hellénique* 108 (1984): 99–109.

184 ———. "Οἱ πηγές τῆς ἀρχαίας 'Ελληνικῆς μουσικῆς," *'Αρχαιολογία* 14 (1985): 8–15.

185 ———. "La phorbéia." *Bulletin de correspondance hellénique* 110 (1986): 205–18.

186 ———. "Studying and Dating Ancient Greek *Auloi* and Roman *Tibiae*: A Methodology." In *The Archaeology of Early Music Cultures. Third International Meeting of the ICTM Study Group on Music Archaeology*, ed. Ellen Hickmann and David W. Hughes, 233–48. Orpheus: Schriftenreihe zu Grundfragen der Musik, vol. 51. Bonn-Bad Godesberg: Verlag für systematische Musikwissenschaft, 1988.

187 ———. "Les terms grecs et latins désignant des spécialités musicales." *Revue de philologie, de littérature et d'histoire anciennes* 62 (1988): 227–50.

188 ———. "La théorie de l'âme chez Aristoxène de Tarente." *Revue de philologie, de littérature et d'histoire anciennes* 59 (1985): 239–46.

189 Bell, Harold Idris. "A Musical Competition in the Third Century B.C." *Aegyptus, serie scientifica* 3 (1925): 13–22.

"Mélanges Lumbroso, Raccolta di scritti in onore di Giacomo Lumbroso."

190 ———. "Specimens of Ancient Greek Music." *Y Cerddor Newydd* 25 (1924): 3–5.

191 Bellermann, Johann Friedrich. *Anonymi scriptio de musica*. Berlin: Förstner, 1841. vi,108 p.

New edition in items 1002–3. See also items 419 and 1259.

192 ———. *Die Hymnen des Dionysius und Mesomedes*. Berlin: Förstner, 1840. 12 p. + 4 tables.

193 ———. *Die Tonleitern und Musiknoten der Griechen*. Berlin: Förstner, 1847; reprint, Wiesbaden: Sändig, 1969. iv,83,6 p.

194 Belling, Karl J. "Plato's Position with Reference to Art, and in Particular to Music." *Music* 1 (1891–92): 197–203, 317–20.

195 Belvianes, Marcel. *Sociologie de la musique*. Paris: Payot, 1950. 216 p.

Benedetto, Vincenzo di. See item 479.

Benedikt, Erwin. See item 532.

196 Bergk, Theodore. "Der musikverständige Philosoph bei Aristot. Politik VIII ist Heraclides Ponticus." *Kleine philologische Schriften*, hrsg. Rudolf Peppmüller, 2:754. Halle: Buchhandlung des Waisenhauses, 1886.

197 ———. "Über das älteste Versmass der Griechen." *Kleine philologische Schriften*, hrsg. Rudolf Peppmüller, 2:392–408. Halle: Buchhandlung des Waisenhauses, 1886.

198 Bernhard, Michael. *Studien zur Epistola de armonica institutione des Regino von Prüm*. Bayerische Akademie der Wissenschaften, Veröffentlichungen der Musikhistorischen Kommission, vol. 5.

Munich: Bayerische Akademie der Wissenschaften, 1979. viii,70 p.

199 Bernhard, Michael; Arno Borst; Detlef Illmer; Albrecht Riethmüller; Klaus-Jürgen Sachs; and Frieder Zaminer. *Rezeption des antiken Fachs im Mittelalter*. Geschichte der Musiktheorie, vol. 3. Darmstadt: Wissenschaftliche Buchgesellschaft, 1990. xi,338 p.

Berno of Reichenau. See item 248.

Berti, Fede. See item 1198.

200 Bethe, Erich. "Die griechische Tragödie und die Musik." *Neue Jahrbücher* 10 (1907): 81–95.

201 Betzler, Dieter. "Ein griechisches Plektron." *Archiv für Musikwissenschaft* 28 (1971): 147–50.

Bezzenberger, A. See item 343.

202 Bidez, Joseph. *Vie de Porphyre, le philosophe néoplatonicien, avec les fragments des traités "Περὶ 'Αγαλμάτων" et "De regressu animae."* Gand: E. Van Goethem; Leipzig: B. G. Teubner, 1913. vii,166,75 p.

203 Biehl, Werner. *Textprobleme in Euripides Orestes*. Göttingen: Hubert, 1955. 99 p.

=Ph.D. dissertation, Jena.

204 Biehle, Herbert. "Les éléments esthétiques de l'art vocal de l'antiquité." *Revue de musicologie* 14 (1930): 22–35.

205 ———. "Stimmkunst in der Antike." In *Die Stimmkunst*, 1–16. Leipzig: Kistner und Siegel, 1931.

206 Blackburn, Bonnie J.; Edward E. Lowinsky; and Clement Miller, eds. *A Correspondence of Renaissance Musicians*. Oxford: Clarendon, 1991. xliv,1067 p.

207 Blass, Friedrich. "Kleine Beiträge zur griechischen Metrik." *Jahrbücher für classische Philologie* 133 (1886): 451–64.

———. See also item 85.

Blom, Erich. See item 1598.

Blume, Friedrich. See items 2, 5, 7, 11, and 14.

208 Boardman, John. *Athenian Red Figure Vases: The Archaic Period*. London: Thames and Hudson, 1975. 252 p.

209 ———. "Some Attic Fragments." *Journal of Hellenic Studies* 76 (1956): 18–20.

210 Boardman, John; Jasper Griffin; and Oswyn Murray, eds. *The Oxford History of the Classical World*. Oxford: Oxford University Press, 1986. x,882 p.

211 Bodley, Nicholas B. "The Auloi of Meroë: A Study of the Greek-Egyptian Auloi Found at Meroë, Egypt." *American Journal of Archaeology* 50 (1946): 217–40 and plates I–VIII.

212 Boeckh, August, ed. *Corpus inscriptionum graecarum*. 4 vols. + index. Berlin: ex Officina Academica, vendit G. Reimeri libraria, 1828-77;

reprint, Hildesheim: Olms, 1977. xxxi,922 + i,1136 + xxi,1271 + xx,595 + ii,167 p.

————. See also items 845 and 1080.

213 Boehm, Beat. "Heilende Musik im griechischen Altertum." *Zeitschrift für Psychotherapie und medizinische Psychologie* 8 (1958): 132–51.

Boer, Willem den. See item 364.

214 Boethius. *Anicii Manlii Severini Boetii Commentarii in Librum Aristotelis Perihermeneias editio secunda, seu maiora commentaria.* 2 vols. Ed. Karl Meiser. Leipzig: B. G. Teubner, 1877–80. x,225 + vi,555 p.

215 ————. *Anicii Manlii Torquati Severini Boetii De institutione arithmetica libri duo: De institutione musica libri quinque. Accedit geometria quae fertur Boetii. E libris manu scriptis.* Edidit Godofredus Friedlein, Leipzig: B. G. Teubner, 1867. viii,492 p.

216 ————. *Fünf Bücher über die Musik.* Aus der lateinischen in die deutsche Sprache übertragen und mit besonderer Berücksichtigung der griechischen Harmonik, sachlich erklärt von Oscar Paul. Leipzig: F. E. C. Leuckart, 1872; reprint, Hildesheim: G. Olms, 1973. lvi,379 p.

Includes an edition of the treatise of Cleonides on pp. 230–44. See also item 1149.

217 ————. *Fundamentals of Music.* Translated, with Introduction and Notes by Calvin Bower. Edited by Claude V. Palisca. Music Theory Translation Series. New Haven, Conn.: Yale University Press, 1989. xv,205 p.

Revision of Ph.D. dissertation, George Peabody College for Teachers, 1967.

————. See also items 121, 237, 287, 300, 924, 927, 1085, 1127, 1269, and 1335.

Boetticher, Wolfgang. See item 1226.

218 Böhme, Robert. *Orpheus. Das Alter des Kitharoden.* Berlin: Weidmann, 1953. 138 p.

219 Bojesen, Ernst Frederik. *De harmonia scientia Graecorum dissertationis pars prior.* Hafniae, S. Trier, 1833. 134 p.

220 ————. *De problematis Aristotelis dissertatio.* Hafniae, Bianco Luno et Schneider, 1836. 118 p.

221 ————. *De tonis sive harmoniis Graecorum commentatio.* Indbydelsesskrift til Sorö Academies Skoles aarlige hovedexamen i Juli 1843. Kjøbenhavn: J. C. Scharling, [1843]. 58 p.

222 Bolgar, R. R. *The Classical Heritage and Its Beneficiaries.* Cambridge: Cambridge University Press, 1954. viii,592 p.

223 Boll, Franz. *Studien über Claudius Ptolemäus. Ein Beitrag zur Geschichte der griechischen Philosophie und Astrologie.* Leipzig: B. G. Teubner, 1894. 198 p.

=*Jahrbücher für classische Philologie* supp. 21 (1894): 66–254.

224 Bonaventura, Arnaldo. *Ricordi e ritratti (fra quelli che ho conosciuto).* Quaderni dell' Accademia Chigiana, vol. 24. Siena: Ticci, 1950. 77 p.

Borecký, B. See item 257.

Borren, Charles van den. See item 1164.

Borst, Arno. See item 199.

225 Borthwick, Edward Kerr. "The Influence of Music on Greek Life and Thought." Ph.D. dissertation, Cambridge, 1952. iv,361 p.

226 ————. "ΚΑΤΑΛΗΨΙΣ—A Neglected Term in Greek Music." *Classical Quarterly* n.s. 9 (1959): 23–29.

227 ————. "Notes on the Plutarch De Musica and the Cheiron of Pherecrates." *Hermes* 96 (1968): 60–73.

228 ————. "The Oxyrhynchos Musical Monody and Some Ancient Fertility Superstitions." *American Journal of Philology* 84 (1963): 225–43.

229 ————. "Some Problems in Musical Terminology." *Classical Quarterly* n.s. 17 (1967): 145–57.

230 ————. "'The Wise Man and the Bow' in Aristides Quintilianus." *Classical Quarterly* n.s. 41 (1991): 275–78.

Bottrigari, Ercole. See item 66.

231 *Bourgeaux, L. "Étude sur la division du canon." Lizentiatenthèse, Louvain, 1940–41.

232 Boussoulas, Nicolas Isidore. *L'être et la composition des mixtes dans le "Philèbe" de Platon.* Paris: Presses universitaires de France, 1952. 203 p.

233 Bowen, Alan C. "Euclid's *sectio canonis* and the History of Pythagoreanism." In *Science and Philosophy in Classical Greece,* ed. A. C. Bowen, 164–87. Sources and Studies in the History and Philosophy of Classical Science, vol. 2. New York: Garland, 1991.

234 ————. "The Foundations of Early Pythagorean Harmonic Science: Archytas, Fragment 1." *Ancient Philosophy* 2 (1982): 79–104.

235 ————. "Menaechmus *versus* the Platonists: Two Theories of Science in the Early Academy." *Ancient Philosophy* 3 (1983): 12–29.

236 ————. "The Minor Sixth (8:5) in Early Greek Harmonic Science." *American Journal of Philology* 99 (1978): 501–6.

————. See also item 132.

237 Bower, Calvin. "Boethius and Nicomachus: An Essay Concerning the Sources of *De institutione musica.*" *Vivarium* 16 (1978): 1–45.

————. See also item 217.

238 Bowra, Cecil Maurice. *Primitive Song.* London: Weidenfeld and Nicolson, 1962. xiv,303 p.

239 Boyancé, Pierre. *Le culte des Muses chez les philosophes grecs.* Bibliothèque des écoles françaises d'Athènes et de Rome, vol. 141. Paris: de Boccard, 1937. 376 p.

240 ————. *Études sur le Songe de Scipion: Essais d'histoire et de psychologie religieuses.* Bibliothèque des universitaires du midi, vol. 20. Limoges: Bontemps, 1936. 193 p.

241 ————. "Les Muses et l'harmonie des sphères." In *Mélanges dédiés à la mémoire de F. Grat,* 3–16. Paris: Pecquer-Grat, 1946.

242 ————. "Note sur l'éther chez les Pythagoriciens Platon et Aristote." *Revue des études grecques* 80 (1967): 202–9.

243 ————. "Note sur la tétractys." *L'Antiquité classique* 20 (1951): 421–25.

244 ————. "La religion astrale de Platon à Cicéron." *Revue des études grecques* 65 (1952): 312–49.

245 ————. "Sur les oracles de la Pythie: II. Les Muses, le 'pneuma' et la 'tétraktys' pythagoricienne à Delphes." *Revue des études anciennes* 40 (1938): 314–16.

246 Bradley, R. H. "Aristotle's Views on Music, and Their Relation to Modern Ideas." *Westminster Review* 179 (1913): 158–68.

247 Bragard, Roger. "Le prétendu traité de musique du Codex Parisinus Latinus 7221." *Musée Belge* 31 (1927): 125–33.

248 Brambach, Wilhelm. *Das Tonsystem und die Tonarten des christlichen Abendlandes im Mittelalter, ihre Beziehungen zur griech-römische Musik und ihre Entwicklung bis auf die Schule Guido's von Arezzo. Mit einer Wiederherstellung der Musiktheorie Berno's von der Reichenau nach einer Karlsruher Handschrift.* Leipzig: B. G. Teubner, 1881. 53 p.

249 Brancacci, Aldo. "Alcidamante e PHibeh 13 «De musica»: Musica della retorica e retorica della musica." In *Aristoxenica, Menandrea, fragmenta philosophica,* ed. Francesco Adorna, 61–84. Studi e testi per il corpus dei papiri filosofici greci e latini, iii; Accademia toscana di scienze e lettere «La Colombaria», Studi, xci. Florence: Olschki, 1988.

Brandel, Rose. See item 1549.

250 Brann, Eva. "The Cutting of the Canon." In *The Collegian,* 1–63. Annapolis: St. John's College, 1962.

Браудо, Е. М. See item 1101.

251 Braun, Ludwig. "Adynata und versus intercalaris im Lied Damons." *Philologus* 113 (1969): 292–97.

252 Brennan, Mary Ellen. "The Material Used in Ancient Modes: Greek and Ecclesiastical." M.M. thesis, Northwestern University, 1947. 30 p.

253 Brill, Bernhard. "Vers- und Wortaccent." *Programm des Friedrichs Collegiums Königsberg* (1879): 3–18.

254 Britt, Ernest E. *La lyre d'Apollon.* Paris: Les éditions Véga, 1931. xxiv,105 p.

Bromby, John Healey. See item 1095.

255 Broneer, Oscar. "Isthmia Excavations, 1952." *Hesperia* 22 (1953): 182–95.

256 Brown, Robert R.; Richard L. Crocker; and Anne Draffkorn Kilmer. *Sounds from Silence: Recent Discoveries in Ancient Near Eastern Music.* Berkeley, California: Bît Enki Publications BTNK 101, 1976. 1 LP disc + 23 p.

257 Browning, Robert. "A Byzantine Treatise on Tragedy." In *ΓΕΡΑΣ: Studies Presented to George Thomson on the Occasion of His 60th Birthday*, ed. L. Varcl and R. F. Willetts in collaboration with B. Borecký, J. Burian, J. Frel, and J. Pečírka, 67–81. Prague: Charles University, 1963.

258 Brussich, Guerrino Francesco. "Un auleta del IV sec. a. C.: Timoteo di Tebe." In *Mousike: Metrica, ritmica e musica greca in memoria di Giovanni Comotti*, ed. Bruno Gentili and Franca Perusino, 145–55. Pisa: Istituti editoriali e poligrafici internazionali, 1995.

259 Bryennius, Manuel. Wallis, John. "Μανουὴλ Βρυεννίου ἀρμονικά. Harmonica, nunc primum edita (Graece & Latine) notisque illustrata." In *Operum mathematicorum*, 3:357–508. Oxoniae, e Theatro Sheldoniano, 1699.

260 ————. *MANOYHΛ BPYENNIOY APMONIKA. The Harmonics of Manuel Bryennius.* Edited with Translation, Notes, Introduction, and Index of Words by G. H. Jonker. Groningen: Wolters-Noordhoff, 1970. 454 p.

=Ph.D. dissertation, Groningen.

————. See also items 318, 929, 1171, and 1380.

261 Bücheler, Franz. "Οἱ περὶ Δάμωνα."*Rheinsiches Museum* 40 (1885): 309–12.

Buck, Percy C. See item 1450.

262 Bürchner, Ludwig. "Griechische Volksweisen." *Sammelbände der Internationalen Musikgesellschaft* 3 (1901–2): 403–29.

Bullialdo, Ismaele. See items 1425–26.

263 Burette, Pierre Jean. "Analyse du dialogue de Plutarque sur la musique." *Mémoires de l'Académie des Inscriptions* 8 (1733): 80–96.

264 ————. "Dissertation servant d'epilogue et de conclusion aux remarques sur le traité de Plutarque, touchant la musique, dans laquelle on compare la théorie de l'ancienne musique avec celle de la musique moderne. Part I et II et Supplément." *Mémoires de l'Académie des Inscriptions* 17 (1751): 61–126.

265 ————. "Dissertation sur la mélopée de l'ancienne musique." *Mémoires de l'Académie des Inscriptions* 7 (1731): 261–319.

266 ————. "Dissertation sur la symphonie des anciens." *Mémoires de l'Académie des Inscriptions* 16 (1746): 116–31.

267 ————. "Examen du traité de Plutarque sur la musique." *Mémoires de l'Académie des Inscriptions* 8 (1733): 27–44.

268 ————. "Observations touchant l'histoire littéraire du dialogue de Plutarque sur la musique." *Mémoires de l'Académie des Inscriptions* 8 (1733): 44–62.

269 ———. "Remarques sur le dialogue de Plutarque touchant la musique." *Mémoires de l'Académie des Inscriptions* 13 (1740): 173–316; 15 (1743): 293–394; 17 (1751): 31–60.

———. See also item 1094.

Burge, E. L. See item 915.

Burian, J. See item 257.

270 Burkert, Walter. *Greek Religion*. Trans. John Raffan. Cambridge: Harvard University Press, 1985. x,493 p.

271 ———. "Hellenistische Pseudopythagorica." *Philologus* 105 (1961): 16–43 and 226–46.

272 ———. *Lore and Science in Ancient Pythagoreanism*. Trans. Edwin L. Minar, Jr. Cambridge: Harvard University Press, 1972. 535 p.

273 ———. *Weisheit und Wissenschaft. Studien zu Pythagoras, Philolaos und Platon*. Erlanger Beiträge zur Sprach- und Kunstwissenschaft, vol. 10. Nürnberg: Hans Carl, 1962.

274 Burkhardt, Hans. "Zur Vertonung griechischer Dramen." *Das Humanistische Gymnasium* 26 (1915): 189.

Burnet, J. See item 1088.

275 Burnett, Anne. "Performing Pindar's Odes." *Classical Philology* 84 (1989): 283–93.

Bury, R. G. See items 1089 and 1353.

276 Bushala, Eugene W. "ῥόπτρον as a Musical Instrument." *Greek, Roman, and Byzantine Studies* 10 (1969): 169–72.

277 Busse, Adolf. "Zur Musikästhetik des Aristoteles." *Rheinisches Museum* 77 (1928): 34–50.

278 Bussfeld, Bernhard. *Die Polymetrischen Chorlieder in Senecas Oedipus und Agamemnon*. Bochum: H. Pöppinghaus, 1935. 63 p.

Butcher, S. H. See item 57.

279 Butzer, Heinrich. "Der Jonicus a maiore." *Programm der Wöhlerschule Frankfurt am Main* (1899): 3–26.

280 Caesar, Karl Julius. *Additamentum disputationis de Aristide Quintiliano*. Indices lectionum et publicarum et privatarum quae in Academia Marburgensi .... Marburg: Robert Friedrich, 1884. xii p.

281 ———. *Adnotata de Aristoxeni elementis rhythmicis*. Indices lectionum et publicarum et privatarum quae in Academia Marburgensi .... Marburg: Robert Friedrich, 1884. xii p.

282 ———. *Aristidis Quintiliani de metris commentarium emendatum atque annotationibus criticis instructum*. Indices lectionum et publicarum et privatarum quae in Academia Marburgensi .... Marburg: Elwert, 1862. xii p.

283 ———. "Aristides Quintilianus und die Solmisation der Griechen." *Jahrbücher für Philologie und Pädagogik* 81 (1860): 871–77.

284 ———. *Disputationem de Aristidis Quintiliani musicae scriptoris aetate*. Indices lectionum et publicarum et privatarum quae in

Academia Marburgensi .... Marburg: Robert Friedrich, 1882. xiv p.

285 ————. *Die Grundzüge der griechischen Rhythmik im Anschluss an Aristides Quintilianus.* Marburg: Elwert, 1861. xii,292 p.

286 Calcidius. *Platonis Timaeus interprete Chalcidio cum eiusdem commentario.* Ed. Ioh. Wrobel. Leipzig: B. G. Teubner, 1876. xxiv,398 p. + 6 tables.

287 Caldwell, John. "The *De Institutione Arithmetica* and the *De Institutione Musica.*" In *Boethius: His Life, Thought and Influence,* ed. Margaret Gibson, 135–54. Oxford: Blackwell, 1981.

Callcott, John. See item 71.

Cambitoglou, A. See item 1455.

288 Cameron, Averil. "The Date and Identity of Macrobius." *Journal of Roman Studies* 56 (1966): 25–38.

289 Campbell, David A. "Flutes and Elegiac Couplets." *Journal of Hellenic Studies* 84 (1964): 63–68.

290 ————, trans. *Greek Lyric.* 5 vols. Loeb Classical Library. Cambridge: Harvard University Press, 1982–93. xix,492 + viii,547 + [viii],652 + [vi],421 + [x],482 p.

See also item 448.

291 Carpi, Leone. "Il papiro musicale di Hibeh." *Rivista musicale italiana* 20 (1913): 487–93.

292 Caskey, L. D. "Archaeological Notes." *American Journal of Archaeology* 41 (1937): 525–27.

293 Cassiodorus. *Cassiodori senatoris Institutiones.* Ed. R. A. B. Mynors. Oxford: Clarendon, 1961. lvi,193 p.

294 ————. "Cassiodorus, from *Fundamentals of Sacred and Secular Learning.*" In *Strunk's Source Readings in Music History,* vol. 2, *The Early Christian Period and the Latin Middle Ages,* ed. James McKinnon, 31–36. New York: Norton, 1998.

295 Cazden, Norman. "Pythagoras and Aristoxenos Reconciled." *Journal of the American Musicological Society* 11 (1958): 97–105.

Cf. item 862.

296 Censorinus. *Censorini de die natali liber ad Q. Caerellium.* Edidit Nicolaus Sallmann. Leipzig: B. G. Teubner, 1983. xxxviii,106 p.

————. See also item 1210.

297 Černý, Miroslav K. "Druhýz hudebněný fragment z Euripida." *Listy filologické* 109 (1986): 132–40.

298 Cesari, Pietro. *Historia de la música antigua.* Traducción y notas de Manuel Walls y Merino. Madrid: Fe, 1891. 93 p.

299 ————. *Storia della musica antica raccontata ai giovani musicisti.* Milan: Ricordi, 1883. 74 p.

300 Chadwick, Henry. *Boethius: The Consolations of Music, Logic, Theology, and Philosophy.* Oxford: Clarendon Press, 1981. xv,313 p.

301 Chaignet, Anselm Édouard. *Essais de métrique grecque. Le vers iambique précédé d'une introduction sur les principes généraux de la métrique grecque.* Paris: F. Vieweg, 1887. 282 p.

302 Chailley, Jacques. "Contribution à une lexicographie musicale de la Grèce antique." *Revue de philologie, de littérature et d'histoire ancienne* 51 (1977): 188–201.

303 ————. "L'Hexatonique grec d'après Nicomaque." *Revue des études grecques* 69 (1956): 73–100.

304 ————. *L'Imbroglio des modes.* Paris: Leduc, 1960. 92 p.

305 ————. "La musique de la tragédie grecque devant une découverte épigraphique." *Revue de musicologie* 39 (1957): 6–9.

306 ————. *La musique grecque antique.* Collection d'études anciennes. Paris: Belles Lettres, 1979. 221 p.

307 ————. "Le mythe des modes grecs." *Acta musicologica* 28 (1956): 137–63.

308 ————. "Mythologie et civilisations musicales dans la Grèce antique." In *L'Expression du sacré en Orient, en Afrique, en Amérique du Sud,* ed. Jacques Porte, 323–37. Encyclopédie des musiques sacrées, vol. 1. Paris: Labergerie, 1968.

309 ————. "Nicomaque, Aristote et Terpandre devant la transformation de l'heptacorde grec en octocorde." *Yuval* 1 (1968): 132–54.

310 ————. "La notation archaïque grecque d'après Aristide Quintilien." *Revue des études grecques* 86 (1973): 17–34.

311 ————. "Nouvelles remarques sur les deux notations musicales grecques." *Recherches de papyrologie* 4 (1967): 201–16.

————. See also item 896.

Chase, Gilbert. See item 563.

312 Chateauneuf, François de Castagneres. *Dialogue sur la musique des anciens.* Paris: N. Pissot, 1725; reprint in Monuments of Music and Music Literature in facsimile, II/38, New York: Broude Bros., 1966. 126 p.

Cherniss, Harold. See item 1102.

313 Chilesotti, Oscar. "Sull' arte greca. Appunti." *Rivista musicale italiana* 15 (1908): 306–8.

314 Chiodaroli, Gianfranco. "Forma musicale e forma plastica." *Acme* 6 (1954): 235–48.

315 Chō, Genshō. "Hikaku-ongakubigaku-shiron, Ōshū kodai to Chūgoku kodai no hikaku." *Research Bulletin of Osaka Musical College* 8 (1969): 1–10.

316 Christ, Wilhelm von. "Grundfragen der melischen Metrik der Griechen." In *Abhandlungen der bayerische Akademie der Wissenschaften,* 211–324. München: G. Franz, 1902.

317 ————. *Metrik der Griechen und Römer.* Leipzig: B. G. Teubner, 1874. xii,684 p.

318 ————. "Über die Harmonik des Manuel Bryennios." *Sitzungsberichte der königlichen bayerischen Akademie der Wissenschaften, Philosophisch-historische Klasse* 64, no. 2 (1870): 241–70.

319 Cianfrocca, Raffaeli. *Prosodia e metrica della lingua greca ad uso delle scuole liceali.* Bologna: Marreggiani, 1884. 57 p.

320 Ciarlantini, Paola. Phonos *ed* ethos: *Aspetti di estetica musicale greca.* Macerata: Olmi, 1985. 60 p.

321 Cicero. *Cicero in Twenty-Eight Volumes.* Vol. 16, *De re publica, De legibus.* Trans. Clinton Walker Keyes. Loeb Classical Library. Cambridge: Harvard University Press, 1928. x,533 p.

322 ————. *Cicero in Twenty-Eight Volumes.* Vol. 6, *Pro Publio Quinctio—Pro Sexto Roscio Amerino—Pro Quinto Roscio Comoedo—De lege agraria I., II., III..* Trans. John Henry Freese. Loeb Classical Library. Cambridge: Harvard University Press, 1930. xii,504 p.

————. See also items 337–38 and 1157.

323 Cleaver, William. *De rhythmo graecorum.* Oxonia: Fletscher, 1789. xiv,150 p.

324 Clément, Félix. *Histoire de la musique depuis les temps anciens jusqu'à nos jours.* Paris: L. Hachette, 1885. vi,823 p.

Clement, P. A. See item 1102.

325 Clements, Ernest. "The Interpretation of Greek Music." *Journal of Hellenic Studies* 42 (1922): 133–66.

326 ————. "The Interpretation of Greek Music: An Addendum." *Journal of Hellenic Studies* 56 (1936): 25–35.

327 Cleonides. *Hoc in volumine hæc opera continentur. Cleonidæ harmonicum introductorium interprete Georgio Valla Placentino. L. Vitruvii Pollionis de architectura libri decemi. Sexti Iulii Frontini de aquæductibus liber unus. Angeli Policiani opusculum: quod panepistemon inscribitur. Angeli Policiani in priora analytica prælectio. Cui Titulus est Lamia.* Impressum Venetiis per Simonem Papiensem dictum Bivilaquam: Die Tertio Augusti, 1497. 94 p., 43 lines per page.

The treatise of Cleonides appears on pp. 2a–5b; this is followed by the *Sectio canonis* on pp. 5b–7v. Valla's translation is based on the texts in Neapolitanus gr. 260 (III.C.2). See items 928 and 931.

328 ————. "A Free Translation of Euclid's [i.e., Cleonides's] Treatise on Harmonics." In *Letters, addressed chiefly to a young gentleman, upon subjects of literature: including a translation of Euclid's section of the canon; and his treatise on harmonic; with an explanation of the Greek musical modes, according to the doctrine of Ptolemy,* by Charles Davy, 2:309–411. 2 vols. Bury St. Edmonds: Printed for the author by J. Rackham, 1787.

329 ————. *L'Introduction harmonique de Cléonide. La division du canon d'Euclide le géomètre. Canons harmoniques de Florence.* Traduc-

tion française avec commentaire perpétuel par Charles-Emile Ruelle. Collection des auteurs grecs relatifs à la musique, no. 3. Paris: Firmin-Didot, 1884. 66 p.

330 ————. "Cleonidis isagoge." In *Musici scriptores graeci,* recog. Carolus Janus, 167–207. Leipzig: B. G. Teubner, 1895; reprint, Hildesheim: G. Olms, 1962.

331 ————. "Introductio harmonica." In *Euclidis Opera omnia,* vol. 8, *Phaenomena et scripta musica,* ed. Henricus Menge, xxxvii–liv, 186–223. Leipzig: B. G. Teubner, 1916.

332 ————. Solomon, Jon. "Cleonides: ΕΙΣΑΓΩΓΗ ΑΡΜΟΝΙΚΗ; Critical Edition, Translation, and Commentary." Ph.D. dissertation, University of North Carolina–Chapel Hill, 1980. viii,389 p.

333 ————. "Introduzione all' armonica." In *La manualistica musicale greca,* ed. and trans. Luisa Zanoncelli, 71–132. Milan: Angelo Guerini, 1990.

The text follows Jan (item 723).

334 ————. "Cleonides, *Harmonic Introduction.*" In *Strunk's Source Readings in Music History,* vol. 1, *Greek Views of Music,* ed. Thomas J. Mathiesen, 35–46. New York: Norton, 1998.

————. See additional entries under "Euclid" and items 216, 382, 721, 1380, and 1386–87.

335 Cobet, Carolus Gabriel. "Aristoxenea." In *Collectanea critica,* 469–76. Lugduni Batavorum: Brill, 1878.

336 Cohn, Leopold. "De Heraclide Pontinco etymologiarum scriptorum antiquissimo." In *Commentationes philologiae in honorem Augusti Reifferscheidii,* 84–92. Breslau: Koebner, 1884.

————. See also item 31.

337 Coleman-Norton, Paul Robinson. "Cicero and the Music of the Spheres." *Classical Journal* 45 (1950): 237–41.

338 ————. "Cicero musicus." *Journal of the American Musicological Society* 1 (1948): 3–22.

339 ————. "Music and Musicians among the Greeks." *Musica* 2 (1935): 175–89.

340 Colin, M. G. "L'Auteur du deuxième hymne musical de Delphes." *Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres* (1913): 529–32.

341 Colish, Marcia L. *Medieval Foundations of the Western Intellectual Tradition 400–1400.* Yale Intellectual History of the West. New Haven, CT: Yale University Press, 1997. xii,388 p.

Colles, H. C. See item 900.

342 Collinson, Francis. "*Syrinx* and Bagpipe: A Romano-British Representation?" *Antiquity* 43 (1969): 305–8.

343 Collitz, Hermann; Fritz Bechtel; A. Bezzenberger; *et al.,* eds. *Sammlung der griechischen Dialekt-Inschriften.* 4 vols. Göttingen: Vanden-

hoeck & Ruprecht, 1884–1915; reprint, Nendeln/Liechtenstein: Kraus, 1973. vi,410 + 963 + 688,x,778 + iv,1232 p.

344 Combarieu, Jules. *La musique et la magie. Étude sur les origines populaires de l'art musical, son influence et sa fonction dans les sociétés.* Études de philologie musicale, vol. 3. Paris: A. Picard, 1909. viii,375 p.

————. See also item 828.

345 Comotti, Giovanni. "L'*anabolé* e il ditirambo." *Quaderni urbinati di cultura classica* n.s. 31 (1989): 107–17.

346 ————. "Un' antica arpa, la *magadis,* in un frammento di Teleste (fr. 808 P.)." *Quaderni urbinati di cultura classica* n.s. 15 (1989): 57–71.

347 ————. "Atena e gli *aulòi* in un ditirambo di Teleste (fr. 805 P.)." *Quaderni urbinati di cultura classica* n.s. 5 (1980): 47–54.

348 ————. "L'Aulo *ghingras* in una scena menandrea del mosaico di Dioscuride." *Quaderni urbinati di cultura classica* 20 (1975): 215–23 + 4 plates.

349 ————. "L'Endecacorde di Ione di Chio." *Quaderni urbinati di cultura classica* 13 (1972): 54–61.

350 ————. "Melodia e accento di parola nelle testimonianze degli antichi e nei testi con notazione musicale." *Quaderni urbinati di cultura classica* n.s. 32 (1989): 91–108.

351 ————. *Music in Greek and Roman Culture.* Trans. Rosaria V. Munson. Baltimore: Johns Hopkins University Press, 1989. xii,186 p.

Revised edition of 352.

352 ————. *La musica nella cultura greca e romana.* Storia della musica, I/1. Torino: Edizioni di Torino, 1979. xiii,112 p.

Expanded in 351.

353 ————. "La musica nella tragedia greca." In *Scena e spettacolo nell' antichità. Atti del Convegno Internazionale di Studio Trento, 28–30 marzo 1988,* ed. Lia de Finis, 43–61. Firenze: L. S. Olschki, 1989.

354 ————. "Un'occasione perduta: La traduzione italiana del *De musica* dello Ps. Plutarco." *Quaderni urbinati di cultura classica* n.s. 31 (1989): 131–37.

355 ————. "Pitagora, Ippaso, Laso e il metodo sperimentale." In *Harmonia mundi: Musica e filosofia nell'antichità: Music and Philosophy in the Ancient World,* ed. Robert W. Wallace and Bonnie MacLachlan, 20–29. Biblioteca di Quaderni urbinati di cultura classica, vol. 5. Roma: Edizioni dell'Ateneo, 1991.

356 ————. "I problemi dei valori ritmici nell' interpretazione dei testi musicali della Grecia antica." In *La musica in Grecia,* ed. Bruno Gentili and Roberto Pretagostini, 17–25. Storia e società. Roma-Bari: Laterza, 1988.

357 ————. "Il valore del termine ἔντασις in Ps. Plut. *De mus.* 28 a proposito dei ritmi di Archiloco." *Quaderni urbinati di cultura classica* n.s. 14 (1983): 93–101.

358 ————. "Words, Verse and Music in Euripides' *Iphigenia in Aulis.*" *Museum philologum Londiniense* 2 (1977): 69–84.

————. See also items 136, 258, 529–30, 568, 945, 1113, 1203, 1475, and 1531.

359 Conati, Marcello. *Interviews and Encounters with Verdi.* Trans. Richard Stokes. London: Gollancz, 1984. xxvii,417 p.

360 Conradt, Carl. *Die Grundlagen der griechischen Orchestik und Rhythmik.* Gymnasial-Programm Greifenberg i. P. Leipzig: Fock, 1909. 20 p.

361 Consbruch, Maximilianus. *De veterum περὶ ποιήματος doctrina.* Abhandlungen Breslauer philologische Untersuchungen, V/3. Breslau: Koebner, 1890. xxxii,127 p.

Concerns the treatise of Aristides Quintilianus.

————. See also item 638.

Cook, Albert Spaulding. See item 851.

362 Cornford, Francis MacDonald. "Mysticism and Science in the Pythagorean Tradition." *Classical Quarterly* 16 (1922): 137–50; 17 (1923): 1–12.

363 ————. *Plato's Cosmology: The* Timaeus *of Plato Translated with a Running Commentary.* London: Routledge & Kegan Paul; New York: Humanities Press, 1937.

Corte, Francesco della. See Della Corte, Francesco.

364 Courcelle, Pierre. "Ambroise de Milan et Calcidius." In *Romanitas et Christianitas: Studia Iano Henrino Waszink A. D. Vi Kal. Nov. A. MCMLXXIII XIII lustra complenti oblata,* ed. Willem den Boer *et al.,* 45–53. Amsterdam: North-Holland, 1973.

365 ————. *Late Latin Writers and Their Greek Sources.* Trans. Harry E. Wedeck. Cambridge: Harvard University Press, 1969. xii,467 p.

Critchlow, Keith. See item 1537.

366 Crocker, Richard L. "Aristoxenus and Greek Mathematics." In *Aspects of Medieval and Renaissance Music: A Birthday Offering to Gustave Reese,* ed. Jan LaRue, 96–110. New York: Norton, 1966.

367 ————. "Pythagorean Mathematics and Music." *Journal of Aesthetics and Art Criticism* 22 (1963–64): 189–98, 325–35.

————. See also item 256.

368 Crönert, Wilhelm. "Die Hibehrede über die Musik." *Hermes* 44 (1909): 503–21.

369 ————. *Memoria Graeca Herculanensis.* Leipzig: B. G. Teubner, 1903. x,318 p.

370 Croissant, Jeanne. *Aristote et les mystères.* Liège, Paris: E. Droz, 1932. ix,217 p.

371 Crusius, Otto. *Die delphischen Hymnen. Untersuchungen über Texte und Melodien.* Göttingen: Dietrich, 1894. 165 p.

372 ———. "Ein Liederfragment auf einer antiken Statuenbasis." *Philologus* 50 (1891): 163–72.

373 ———. "Σύμπτυκτοι ἀνάπαιστοι." *Rheinisches Museum* 43 (1888): 197–202.

See also items 1391 and 1545.

374 ———. "Über die Nomosfrage." In *Verhandlungen der 39. Versammlung deutscher Philologen und Schulmänner Zürich 1887,* 258–76. Leipzig: B. G. Teubner, 1888.

375 ———. "Zu neuentdeckten antiken Musikresten. I. Nachträgliches über die Seikilosinschrift. II. Fragment einer Partitur des euripideischen Orestes." *Philologus* 52 (1894): 160–200, 208.

———. See also item 667.

Cserba, S. M. See item 652.

376 Curtis, John. "The Double Flutes." *Journal of Hellenic Studies* 34 (1914): 89–105.

377 ———. "Greek Music." *Journal of Hellenic Studies* 33 (1913): 35–47.

378 ———. "Reconstruction of the Greater Perfect System." *Journal of Hellenic Studies* 44 (1924): 10–23.

379 Dabo-Peranić, Miljenko M. *Aristoteles. Greek Ascendant Musical Diagrams.* East Northport, N.Y.: Sunrise Press, [1988].

380 ———. *The Greek* Harmoniai *Identical with the Church* Modi. East Northport, N.Y.: Sunrise Press, [1988].

381 ———. *Greek Prehistoric Music Discovered and Deciphered.* East Northport, N.Y.: Sunrise Press, 1985.

382 ———. *Greek Pseudo-Harmoniai of Pseudo-Eukleides.* East Northport, N.Y.: Sunrise Press, [1988].

383 ———. *Les harmonies grecques classiques, ces inconnues.* Musices graecai corrigenda, no. 1. Paris: By the author, 1959.

384 ———. *Hellenistic Notation.* East Northport, N.Y.: Sunrise Press, n.d.[1988?].

385 d'Acosta, Paul. *Essai de philologie musicale. Études d'histoire et d'esthétique comparées sur la musique à travers les âges.* Gand: A. Siffer, 1896. 134 p.

386 Dahlhaus, Carl. "Ein vergessenes Problem der antiken Konsonanztheorie." In *Festschrift für Walter Wiora zum 30. Dezember 1966,* hrsg. Ludwig Finscher und Christoph-Hellmut Mahling, 164–69. Kassel: Bärenreiter, 1967.

387 Dale, Amy Marjorie. *The Lyric Meters of Greek Drama.* Cambridge: Cambridge University Press, 1948. 220 p.

388 *Damm, Christian Tobias. *Versuch einer prosaischen Übersetzung der griechischen Lieder des Pindar. Erste Abtheilung, die Olympischen Sieges-Lieder in sich enthaltend; zweite Abtheilung, die Pythischen Sieges-Lieder in sich enthaltend; dritte und vierte Abtheilung, die Nemeischen und Isthmischen Sieges-Lieder in sich enthaltend.* Berlin, Leipzig: Ringmacher, 1770–71.

389 Danek, Georg. "'Singing Homer': Überlegungen zu Sprechintonation und Epengesang." *Wiener humanistische Blätter* 31 (1989): 1–15.

390 Darack, Arthur. "Aesthetics of Music: Early Greek Views." Ph.D. dissertation, Indiana University, 1951. 181 p.
UM 10-420. *DA* 14 (1954): 2363-A.

Da Rios, Rosetta. See item 84.

Dasypodius, Konrad. See item 465.

391 Daux, Georges. *Delphes au IIe et au Ier siècle depuis l'abaissement de l'Étoile jusqu'à la paix romaine.* Paris: de Boccard, 1936. iv,746 p.

Davison, Archibald T. See item 1289.

392 Davy, Charles. *Letters, addressed chiefly to a young gentleman, upon subjects of literature: including a translation of Euclid's section of the canon; and his treatise on harmonic; with an explanation of the Greek musical modes, according to the doctrine of Ptolemy.* 2 vols. Bury St. Edmonds: Printed for the Author by J. Rackham, 1787. xii,425 + 544 p.

————. See also items 328, 472, and 1148.

de Angeli, Andrea. See Angeli, Andrea de.

393 *De veteris Graecorum musices in omnes scientias usu, et energia divinatio.* Venetiis, typis A. Zatta, 1762. 35 p.

Deane, Norma. See item 1053.

394 Dechavanne, Yves. "L'Éducation musicale en Grèce des origines à Platon." *Archaeologia: Trésors des âges* 56 (1972): 46–49.

395 d'Eichthal, Eugène. "Nouvelles observations sur les problèmes musicaux attribués à Aristote." *Revues des études grecques* 13 (1900): 18–44.

————. See also item 1192.

396 Deiters, Hermann. *De Aristidis Quintiliani doctrinae harmonicae fontibus.* Programm Düren. Bonn, 1870. 22 p.

397 ————. *Studien zu den griechischen Musikern. Über das Verhältnis des Martianus Capella zu Aristides Quintilianus.* Program des Königlichen Marien-Gymnasiums in Posen. Posen: Merzbach, 1881. 48 p.

De Lacy, Phillip H. See item 1102.

De Lacy, Phillip H., and Estelle A. De Lacy. See item 1065.

398 Delboeuf, Joseph. "L'Hexamètre et l'Alexandrien. Lecture." *Revue de l'instruction publique en Belgique* 27 (1884): 245–58, 293–310.

399 Del Grande, Carlo. "Damone metrico." In *Filologia minore,* 197–214. Milan, Naples: R. Ricciardi, 1956.
=*Giornale italiano di filologia* 1 (1948): 3–16.

400 ————. *Espressione musicale dei poetici greci.* Naples: R. Ricciardi, 1932. xii,274 p.

401 ————. "Inno cristiano antico." *Rivista Indo-Greca-Italica* 7 (1923): 173–79.

402 ———. "Intorno ai papiri musicali scoperti in Egitto." *Chronique d'Égypte* 6 (1931): 441–55.

403 ———. "Musica enarmonica nell' antica Grecia." *Rivista musicale italiana* 36 (1929): 533–47.

404 ———. "Nomos citarodico." *Rivista Indo-Greca-Italica* 7 (1923): 1–17.

405 ———. "Nuovo frammento di musica greca in un papiro del museo del Cairo." *Aegyptus, serie scientifica* 5 (1936): 369–82. "Atti del IV congresso di papirologia, Milan, 1936."

406 ———. *Sviluppo musicale dei metri greci.* Naples: Stab. industrie editoriali meridionali, 1927. vi,144 p.

407 ———. *Tentativi e possibilità di ricostruzione della musica greca antica.* Siracusa: Istituto nazionale del dramma antico, 1935. 34,xxii p.

———. See also item 549.

408 Delattre, Daniel. "Philodème de la musique: Livre IV, colonnes 40* à 109*." *Cronache Ercolanesi* 19 (1989): 49–143.

409 Della Corte, Francesco. "Otto papiri letterari editi e inediti del Museo Berlinense." *Rivista di filologia* n.s. 14 (1936): 392–95.

410 Denniston, John Dewar. "Some Recent Theories of the Greek Modes." *Classical Quarterly* 7 (1913): 83–99.

411 d'Erlanger, Rodolphe. *La musique Arabe.* 6 vols. Paris: Paul Guenther, 1930–59. 329 + 310 + 618 + 530 + 426 + 644 p.

412 Deubner, Ludwig. "Paian." *Neue Jahrbücher* 22 (1919): 385–406.

413 ———. "Terpander und die siebensaitige Leier." *Berliner philologische Wochenschrift* 50 (1930): 1566–67.

414 ———. "Die viersaitige Leier." *Mitteilungen des deutschen archäologischen Instituts* 54 (1929): 194–200.

Deusen, Nancy van. See item 934.

415 Dewaele, Jacques. "Une genèse difficile: La notion de 'rhythme.'" *Archives internationales d'histoire des sciences* 6 (1953): 420–29.

416 Diehl, Ernst. "Fuerunt ante Homerum poetae." *Rheinisches Museum* 89 (1940): 81–114.

417 Diels, Hermann. *Die Fragmente der Vorsokratiker.* Berlin: Weidmann, 1903. x,601 p.

418 Di Giulio, Maria. "Iconografia degli strumenti musicali nell' arte apula." In *La musica in Grecia*, ed. Bruno Gentili and Roberto Pretagostini, 108–120. Storia e società. Roma-Bari: Laterza, 1988.

Dindorf, Wilhelm. See item 745.

419 Dionysius. "Εἰσαγωγὴ τέχνης μουσικῆς Βακχείου τοῦ γέροντος." In *Anonymi scriptio de musica,* by Johann Friedrich Bellermann, 101–8. Berlin: Förstner, 1841.

420 ———. "Introduction à l'art musical par Bacchius l'ancien." In *Notice sur trois manuscrits grecs relatifs à la musique, avec une traduction française et des commentaires,* by A. J. H. Vincent, 64–72.

Notices et extraits des manuscrits de la Bibliothèque du Roi et autres bibliothèques, vol. 16. Paris: Imprimerie Royale, 1847.

————. See also items 192 and 642.

421 Dionysius of Halicarnassus. *Dionysius of Halicarnassus On Literary Composition*. Ed. and trans. W. Rhys Roberts. London: Macmillan, 1910; reprint, New York: AMS Press, 1976. xiii,358 p.

422 Dirlmeier, Franz. "Κάθαρσις Παθημάτων." *Hermes* 75 (1940): 81–92.

423 Dittenberger, Karl Friedrich Wilhelm. *Sylloge inscriptionum graecarum*. 3d ed. 4 vols. Leipzig: Hirzel, 1915–24; reprint, Hildesheim: Olms, 1982. xx,780 + 627 + 402 + vi,638 p.

424 Donado, José Vara. "Μέλος y elegia." *Emerita, boletín de linguística y filología clásica* 40 (1972): 433–51.

425 Doni, Giovanni Battista. *De praestantia musicae veteris libri tres*. Florentiae, Amatoris Massae Foroliuien, 1647; reprint, Hildesheim: G. Olms, 1986. 166 p.

————. See also items 1029–30.

426 Doutzaris, P. "La rhythmique dans la poésie et la musique des grecs anciens." *Revue des études grecques* 47 (1934): 297–345.

427 Drewes, Ludwig. "Zur Theorie des Dochmius." *Jahrbücher für classische Philologie* 121 (1880): 409–16.

428 Drieberg, Friedrich von. *Aufschlüsse über die Musik der Griechen*. Leipzig: Cnobloch, 1819. 182 p.

429 ————. *Die griechische Musik auf ihre Grundgesetze zurückgeführt*. Berlin: Trautwein, 1841. 25 p.

430 ————. *Die mathematische Intervallenlehre der Griechen*. Berlin: By the author, 1818. 60 p.

431 ————. *Die musikalischen Wissenschaften der Griechen*. Berlin: Trautwein, 1820. 107 p.

432 ————. *Die praktische Musik der Griechen*. Berlin: Trautwein, 1821. 104 p.

433 ————. *Wörterbuch der griechischen Musik in ausführlichen Artikeln über Harmonik, Rhythmik, Metrik, Kanonik, Melopoie, Rhythmopoie, Theater, u.s.w. Nach den Quellen neubearbeitet*. Berlin: Schlesinger, 1835. vi,219 p.

Duchesne, Jacques. See item 590.

434 Duchesne-Guillemin, Marcelle. "Survivance orientale dans la désignation des cordes de la lyre en Grèce?" *Syria* 44 (1967): 233–46.

————. See also item 590.

435 Duey, Philip A. "Vocal Art in Antiquity." *Musical Quarterly* 32 (1946): 390–410.

436 Dugas, Charles. "Héraclès Mousicos." *Revue des études grecques* 57 (1944): 61–70.

437 Dühr, August. *Über Metrik und Rhythmik*. Gymnasium zu Friedland, Programm 1885. Friedland i.M.: W. Walther, 1885. 28 p.

Dupuis, Jean. See items 1428–29.

438 Düring, Ingemar. "Greek Music: Its Fundamental Features and Its Significance." *Journal of World History* 3 (1956): 302–29.

439 ————. "Impact of Greek Music on Western Civilization." In *Proceedings of the Second International Congress of Classical Studies* [1954], 169–84. Copenhagen: E. Munksgaard, 1958.

440 ————. "Studies in Musical Terminology in 5th Century Literature." *Eranos* 43 (1945): 176–97.

441 ————. "Von Aristoteles bis Leibnitz. Einige Hauptlinien in der Geschichte des Aristotelismus." *Antike und Abendland* 4 (1954): 132–39.

————. See also items 662, 1125–26, and 1150.

442 Duse, Ugo. "La lira di Ione di Chio." *Quaderni urbinati di cultura classica* n.s. 4 (1980): 113–23.

443 ————. "Das Scholion zu Aristides Quintilianus 3,2 S. 98,8–21 W.-I." *Philologus* 120 (1976): 309–13.

444 Dušek, Bohumil. "Obrys stařorecké stupnice." *Hudební Věda* 7 (1970): 35–45.

445 Duysinx, François. "Accents, mélodie et modalité dans la musique antique." *L'Antiquité classique* 50 (1981): 306–17.

446 ————. "Asclépiodote et le monocorde." *L'Antiquité classique* 38 (1969): 447–58.

447 ————. "Homère et les instruments de musique." *Didaskalikon* 38 (1977): 17–22.

448 Edmonds, J. M., ed. and trans. *Lyra Graeca,* vols. 2–3. Loeb Classical Library. Cambridge: Harvard University Press, 1924–27. x,476 + xii,720.

See also item 290.

449 Egenolff, Peter. "Zur Geschichte der Überlieferung griechischen Metriker." *Jahrbücher für classische Philologie* 135 (1887): 389–408.

450 Eggar, K. "Emotion and Moral in Greek Music." *Music and Letters* 11 (1930): 124–28.

Einarson, Benedict. See item 1102.

Einstein, Alfred. See item 1228.

451 Eitrem, Sam. "Opferaufzug und Opfermusik auf korinthischem Amphoriskos." *'Αρχαιολογικὴ ἐφημερίς* 1953–1954 (1955): 25–34.
"Εἰς μνήμην Γεωργίου Π. Οἰκονόμου"

452 Eitrem, Sam; L. Amundsen; and R. P. Winnington-Ingram. "Fragments of Unknown Greek Tragic Texts with Musical Notation." *Symbolae Osloenses* 31 (1955): 1–87.

453 Ellis, Alexander John. "Tonleitern verschiedener Völker." *Sammelbände für vergleichende Musikwissenschaft* 1 (1922): 1–75.

————. See also item 631.

454 Ellis, Catherine. "Pre-Instrumental Scales." *Ethnomusicology* 9 (1965): 126–37.

455 Ellsworth, Oliver B., ed. and trans. *The Berkeley Manuscript: University of California Music Library, MS. 744 (*olim *Phillipps 4450).* Greek and Latin Music Theory, vol. 2. Lincoln: University of Nebraska Press, 1984. x,317 p.

456 Else, Gerald Frank, "'Imitation' in the Fifth Century." *Classical Philology* 53 (1958): 73–90.

457 Emmanuel, Maurice. "Grèce." In *Encyclopédie de la musique et dictionnaire du Conservatoire,* I/1:377–537. 11 vols. in 2 parts. Paris: Delagrave, 1913–31.

458 Engelbrecht, August. "Die Cäsuren des homerischen Hexameters. Randglossen zu den Lehren der antiken und modernen Metriker." *Serta Harteliana* (1896): 293–312.

Epstein, Ann Wharton. See item 770.

459 Erckmann, Fritz. "Sphärenmusik." *Zeitschrift der Internationalen Musikgesellschaft* 9 (1907–8): 417–25.

Ersch, J. S. See item 504.

460 Eskuche, Gustav. "Das griechische Drama als lebendige Kraft im deutschen Kunstleben." *Das humanistische Gymnasium* 26 (1915): 137–43.

461 Esmann, Friedrich E. M. "De organis Graecorum musicis. Pars prior (Veterum testamonia per literas tradita continens)." Ph.D. dissertation, Wismar, 1880. 66 p.

462 Estève, J. "Les innovations musicales dans la tragédie grecque à la époque d'Euripide." Ph.D. dissertation, Paris, 1902. xiv,308 p.

463 Euclid. *Εὐκλείδου εἰσαγωγὴ ἀρμονική - τοῦ αὐτοῦ κατατομὴ κανόνος. Euclidis rudimenta musices.* Ioanne Pena regio mathematico interprete. Ad illustrissimum Principem Carolum Lotharingum Cardinalem. Parisiis, apud A. Wechelum, 1557. 16 p.

464 ———. *Le livre de la musique d'Euclide.* Traduit par Pierre Forcadel. Paris: C. Perier, 1566. 24 p.

465 ———. *Euclidis omnes omnium librorum propositiones graece et latine.* Ed. Konrad Dasypodius. Strasbourg: Christianus Mylius, 1571. 93 (i.e., 95) + 98 (i.e., 103) leaves.

466 ———. "Euclidis musica, quae olim Graece, et Latine mutila et multis in locis manca prodierat in lucem Parisiis per Io. Penam regium mathematicum, nunc ab Antonio Posseuino S. I. restituta è Vaticanae Bibliothecae, ac Fulvii Vrsini codicibus manuscriptis, et illustrata notis aliquibus ad marginem positis." In *Bibliothecae selectae, pars secunda,* by Antonius Possevinus, 187–97. Romae, ex typographia Apostolica Vaticana, 1593.

Additional comments of interest appear on pp. 182–83. An extensive listing of writers on music from antiquity to the time of Possevinus appears on p. 184.

467 ———. "Euclidis sectio regulae harmonicae cum viginti theorematibus." In *Bibliothecae selectae, pars secunda,* by Antonius Possevinus, 197–200. Romae, ex typographia Apostolica Vaticana, 1593.

468 ———. "Musique d'Euclide." In *Traité de l'harmonie universelle, où est contenu la musique theorique et pratique des anciens et modernes, avec les causes de ses effets. Enrichie de raisons prises de la philosophie, et de mathematiques,* by Marin Mersenne, 106–46. Paris: Guillaume Baudry, 1627.

The treatise now ascribed to Cleonides occupies pp. 106–25; the Euclidean *sectio canonis* is given on pp. 126–46. Proposition 20 of the *sectio canonis* is explained in Mersenne's own words rather than translated.

469 ———. "Euclidis musica (La Musique d'Euclide)." In *Cursus mathematicus, nova brevi et clara methodo demonstratus,* ed. and trans. Pierre [Clément Cyriaque de Margin] Herigone, 5:802–35. 5 vols. Paris: Henry Le Gras, 1634–1637.

The text follows that of Pena (item 463)

470 ———. "Euclidis introductio harmonica et sectio canonis musici, vertit, ac notis explicavit Marc. Meibomius." In *Antiquae musicae auctores septem,* Marc. Meibomius restituit ac notis explicavit. Amstelodami, apud Ludovicum Elzevirium, 1652; reprint in Monuments of Music and Music Literature in Facsimile, II/51, New York, Broude Brothers, 1977. 68 p.

Each of the first six treatises in the volume is separately paginated. In this section, the "Introductio harmonica" appears on pp. 1–22, the "Sectio canonis" on pp. 23–40, and annotations on pp. 41–68.

471 ———. *Euclidis quae supersunt omnia.* Ed. and trans. David Gregorius. Oxford: Theatrum Sheldonianum, 1703.

The *Division* appears on pp. 547–56.

472 ———. "Euclid's Introduction to the Section of the Canon." In *Letters, addressed chiefly to a young gentleman, upon subjects of literature: including a translation of Euclid's section of the canon; and his treatise on harmonic; with an explanation of the Greek musical modes, according to the doctrine of Ptolemy,* by Charles Davy, 2:264–90. 2 vols. Bury St. Edmonds: Printed for the author by J. Rackham, 1787.

473 ———. "Euclidis sectio canonis." In *Musici scriptores graeci,* recog. Carolus Janus, 113–66. Leipzig: B. G. Teubner, 1895; reprint, Hildesheim: G. Olms, 1962.

474 ———. "Scripta musica." In *Euclidis Opera omnia,* vol. 8, *Phaenomena et scripta musica,* ed. Henricus Menge, xxxvii–liv, 158–83. Leipzig: B. G. Teubner, 1916.

475 ———. Mathiesen, Thomas J. "An Annotated Translation of Euclid's Division of a Monochord." *Journal of Music Theory* 19 (1975): 236–58.

476 ————. Kárpáti, András. "Eukleidés: A Kanón Beosztása. Tanulmány és fordítás," *Zenetudományi dolgozatok* (1987): 7–27.

477 ————. "The Euclidean *Sectio canonis.*" In *Greek Musical Writings,* 2 vols., ed. Andrew Barker, 2:190–208. Cambridge Readings in the Literature of Music. Cambridge: Cambridge University Press, 1984–89.

478 ————. "Sectio canonis." In *La manualistica musicale greca,* ed. and trans. Luisa Zanoncelli, 29–70. Milan: Angelo Guerini, 1990.

The text follows Jan (item 723).

————. See additional entries under "Cleonides" and items 119, 125, 139, 233, 771, 829, 854, 876, 1278, and 1416.

479 Euripides. *Euripidis Orestes.* Introd., testo critico, commento e appendice metrica a cura di Vincenzo di Benedetto. Florence: "La Nuova Italia" Editrice, 1965. xxxi,318 p.

————. See also items 203, 297, 358, 375, 462, 489, 749–50, 871, 925, 981, 1051, 1175, 1214, 1221, 1223, 1274, 1307, 1382, 1452, 1552–53, and 1587.

480 Eustathius, Archbishop. *Eustathii archiepiscopi Thessalonicensis commentarii ad Homeri Iliadem pertinentes.* Rec. Marchinus van der Valk. 4 vols. Leiden: Brill, 1971–87. clx,802 + cxx,838 + xxxii,944 + xxx,991 p.

Evelyn-White, Hugh G. See item 645.

Fabricius, Io. Albertus. See item 1350.

481 Fairclough, H. Rushton. "The Connection between Music and Poetry in Early Greek Literature." In *Studies in Honor of Basil L. Gildersleeve,* 205–27. Baltimore: Johns Hopkins Press, 1902.

————. See also item 676.

482 Farmer, Henry George. *Al-Fārābī's Arabic-Latin Writings on Music.* Collection of Oriental Writers on Music, vol. 2. New York: Hinrichsen, 1965. [viii],65 p.

483 ————. "An Early Greek Pandore." *Journal of the Royal Asiatic Society* (1949): 177–79.

484 ————. "Greek Theorists of Music in Arabic Translation." *Isis* 13 (1930): 325–33.

485 ————. *Historical Facts for the Arabian Musical Influence.* London: Wm. Reeves, 1930. xii,376 p.

486 ————. "The Music of Ancient Egypt." In *Ancient and Oriental Music,* ed. Egon Wellesz, 255–82. New Oxford History of Music, vol. 1. London: Oxford University Press, 1957.

487 ————. "The Music of Islam." In *Ancient and Oriental Music,* ed. Egon Wellesz, 421–77. New Oxford History of Music, vol. 1. London: Oxford University Press, 1957.

488 ————. *Sa'adyah Gaon on the Influence of Music.* London: Arthur Probsthain, 1943. xi,109 p.

489 Feaver, Douglas D. "The Musical Setting of Euripides' Orestes." *American Journal of Philology* 81 (1960): 1–15.

490 ————. "A New Note, Omega, in the Orestes Papyrus?" *American Journal of Philology* 99 (1978): 38–40.

Federhofer, Hellmut. See item 855.

491 Fellerer, Karl Gustav. "Zur Erforschung der antiken Musik im 16.–18. Jahrhundert." *Jahrbuch der Musikbibliothek Peters* 42 (1936): 84–95.

————. See also item 595.

492 Festugière, André Jean. "L'Âme et la musique d'après Aristide Quintilien." *Transactions of the American Philological Association* 85 (1954): 55–78.

493 Fétis, François J. "Mémoire sur l'harmonie simultanée des sons chez les Grecs et les Romains." *Mémoires de l'Académie de Belgique* 31 (1859): 1–120.

See also item 1498.

Feussner, Heinrich. See items 73–74.

Finis, Lia de. See item 353.

Finscher, Ludwig. See item 386.

494 Fischer, Wilhelm. "Das Grablied des Seikilos." In *Ammann-Festschrift; besorgt vom Seminar für vergleichende Sprachwissenschaft an der Universität Innsbruck anlässlich der Feier d. 25jähr. Dienstjubiläums*, 153–65. Innsbrucker Beiträge zur Kulturwissenschaft, vols. 1–2. Innsbruck: Sprachwiss. Seminar d. Univ., 1953–54.

495 Fisher, Fred. "Music and the Wheel: The Oedipus Story." *Interdisciplina* 1, no. 3 (1976): 38–54.

496 Fitton, J. W. "Greek Dance." *Classical Quarterly* n.s. 23 (1973): 254–74.

497 Fleischer, Oskar. "Sind die Reste der altgriechischen Musik noch heute künstlerisch wirksam?" *Zeitschrift der Internationalen Musikgesellschaft* 1 (1899–1900): 49–62.

498 ————. "Vorgeschichtliche Musiktheorie in Europa." *Mannus* 12 (1920): 276–303.

499 Fleming, Thomas J. "The Musical Nomos in Aeschylus' *Oresteia*." *Classical Journal* 72 (1977): 222–33.

500 Fleming, Thomas, and E. Christian Kopff. "Colometry of Greek Lyric Verses in Tragic Texts." *Studi italiani di filologia classica* 3d series 10 (1992): 758–70.

501 Fleury, Amédée. "L'Hymne à Apollon retrouvé à Delphes et la musique religieuse." *Études religieuses, philosophiques, historiques, et littéraires* 62 (1894): 318–21.

Forcadel, Pierre. See item 464.

502 Forman, Robert J. "Augustine's Music: 'Keys' to the *Logos*." In *Augustine on Music: An Interdisciplinary Collection of Essays*, ed. Richard R.

La Croix, 17–27. Studies in the History and Interpretation of Music, vol. 6. Lewiston, N.Y.: Edwin Mellen Press, 1988.

Forster, E. S. See item 60.

Fortenbaugh, W. See item 145.

503 Fortlage, Karl. *Das musikalische System der Griechen in seiner Urgestalt aus den Tonleitern des Alypius zum ersten Male entwickelt.* Leipzig: Breitkopf und Härtel, 1847. vi,140 p. + 2 tables.

504 ————. "Griechenland. A. Alt-Griechenland. Musik, Rhythmik, und Metrik." In *Allgemeine Enzyklopädie der Wissenschaft und Künste,* ed. J. S. Ersch and J. G. G. Gruber, I/81:175–245. 168 vols. Leipzig: J. F. Gleditsch, 1818-1889.

505 ————. "Über den Zustand der Musik bei den alten Griechen." *Allgemeine musikalische Zeitung* 49 (1847): 817–27, 841–47, 857–62.

Fowler, H. N. See items 1089 and 1102.

Fox Strangways, A. H. See item 1050.

506 Franchi, Saverio. "Monodia e coro: Tradizione classica, scritti critici e origini del melodramma. Sopravvivenze di una danza greca nell' Europa medievale e moderna." In *La musica in Grecia,* ed. Bruno Gentili and Roberto Pretagostini, 35–71. Storia e società. Roma-Bari: Laterza, 1988.

507 Frank, Erich. *Plato und die sogenannten Pythagoreer. Ein Kapitel aus die Geschichte des griechischen Geistes.* Halle: M. Niemeyer, 1923. x,400 p.

508 Franzius, Ioannes. *De musicis graecis commentatio. Inest fragmentum ineditum ad Cl. Ptolemaei harmonicam pertinens.* Berlin: G. Besser, 1840. 23 p.

509 Freeman, Kathleen. *Ancilla to the Pre-Socratic Philosophers: A Complete Translation of the Fragments in Diels,* Fragmente der Vorsokratiker. Cambridge: Harvard University Press, 1971. x,162 p.

Freese, John Henry. See item 322.

Frel, J. See item 257.

510 Friedländer, Ludwig. *Sittengeschichte Roms.* Ungekürzte Textausgabe. Wien: Phaidon, 1934. 1044 p.

511 Friedländer, Paul. *Studien zur antiken Literatur und Kunst.* Berlin: W. de Gruyter, 1969. ix,701 p.

Friedlein, Gottfried. See item 215.

512 Fritz, Kurt von. *Mathematiker und Akusmatiker bei den alten Pythagoreern.* Bayerische Akademie der Wissenschaften, Philosophisch-Historische Klasse, Sitzungsbericht. München: Bayerische Akademie der Wissenschaften, 1960. 26 p.

513 Fritzsche, Franz. "De numeris dochmiacis." Index lectionum in Academia rostochiensi, 1874–87.

The first two parts appear in the Programs for 1874; part 3 in the Program for hib. 1884, pp. 6–8; part 4, aest. 1885, pp. 3–8; part 5, hib. 1885, pp. 3–10; part 6, aest. 1886, pp. 3–8; part 7 in

Coniectanea, hib. 1886, pp. 3–6; and part 8 in Coniectanea, part 2, aest. 1887, pp. 3–7.

Fritzsche, Theodore. See item 642.

Frontinus, Sextus Julius. See item 327.

Gaisford, Thomas. See item 637.

514 Galilei, Vincenzo. *Dialogo della musica antica e moderna.* Florence: Marescotti, 1581. ii,160 p.

————. See also item 1031.

515 Gallo, F. Alberto. "Greek Text and Latin Translations of the Aristotelian *Musical Problems*: A Preliminary Account of the Sources." In *Music Theory and Its Sources: Antiquity and the Middle Ages,* ed. André Barbera, 190–96. Notre Dame, Ind.: Notre Dame University Press, 1990.

516 ————. "Le traduzioni dal Greco per Franchino Gaffurio." *Acta musicologica* 35 (1963): 172–74.

517 Gamba, O. "Il nomos policefalo." *Dioniso* 6 (1938): 235–52.

518 Gamberini, Leopoldo. *La parola e la musica nell' antichità, confronto fra documenti musicali antichi e dei primi secoli del medioevo.* Historiae musicae cultores, vol. 15. Firenze: L. S. Olschki, 1962. xii,450 p.

————. See also item 1107.

519 Gamucci, Baldassare. *Perchè i Greci antichi non progredirono nell' armonia: memoria.* Firenze: G. G. Guidi, 1881. 71 p.

520 Garrod, Heathcote William. "The Hyporcheme of Pratinas." *Classical Review* 34 (1920): 129–36.

521 Gaudentius. "Gaudentii philosophi. Harmonica introductio. Marc. Meibomius primus Latine vertit, ac notis illustravit." In *Antiquae musicae auctores septem,* Marc. Meibomius restituit ac notis explicavit. Amstelodami, apud Ludovicum Elzevirium, 1652; reprint in Monuments of Music and Music Literature in Facsimile, II/51, New York, Broude Brothers, 1977. 40 p.

Each of the first six treatises in the volume is separately paginated.

522 ————. "Gaudenti philosophi harmonica introductio." In *Musici scriptores graeci,* recog. Carolus Janus, 317–56. Leipzig: B. G. Teubner, 1895; reprint, Hildesheim: G. Olms, 1962.

523 ————. "Introduzione all' armonica." In *La manualistica musicale greca,* ed. and trans. Luisa Zanoncelli, 305–369. Milan: Angelo Guerini, 1990.

The text follows Jan (item 723).

524 ————. "Gaudentius, *Harmonic Introduction.*" In *Strunk's Source Readings in Music History,* vol. 1, *Greek Views of Music,* ed. Thomas J. Mathiesen, 66–85. New York: Norton, 1998.

————. See also items 26 and 771.

525 Geanakoplos, Deno John. *Byzantium: Church, Society, and Civilization Seen through Contemporary Eyes.* Chicago: University of Chicago Press, 1984. xxxix,485 p.

526 Gebeschus, J. *Geschichte der Musik von den ältesten vorchristlichen Zeiten bis auf die Gegenwart.* Berlin: A. Schultze, 1895. viii,272 p.

Gelder, J. J. de. See item 1426.

527 Gentili, Bruno. "Metro e ritmo nella dottrina degli antichi e nella prassi della «performance»." In *La musica in Grecia,* ed. Bruno Gentili and Roberto Pretagostini, 5–16. Storia e società. Roma-Bari: Laterza, 1988.

528 ————. *Theatrical Performances in the Ancient World: Hellenistic and Early Roman Theatre.* London Studies in Classical Philology, vol. 2. Amsterdam: J. C. Gieben, 1979. 117 p.

529 Gentili, Bruno, and Liana Lomiento. "Problemi di ritmica greca. Il monocrono (Mart. Cap. *De nupt.* 9,982; *P. Oxy.* 2687+9); l'elemento *alogos* (Aristid. Quint. *De mus.* 17)." In *Mousike: Metrica, ritmica e musica greca in memoria di Giovanni Comotti,* ed. Bruno Gentili and Franca Perusino, 61–75. Pisa: Istituti editoriali e poligrafici internazionali, 1995.

See also items 80, 87, 801, 1160, and 1253.

530 Gentili, Bruno, and Franca Perusino, eds. *Mousike: Metrica, ritmica e musica greca in memoria di Giovanni Comotti.* Pisa: Istituti editoriali e poligrafici internazionali, 1995. xvi,380 p.

————. See also items 136, 258, 529, 568, 945, 1113, 1203, 1475, and 1531.

531 Gentili, Bruno, and Roberto Pretagostini, eds. *La musica in Grecia.* Storia e società. Roma-Bari: Laterza, 1988. xii,317 p.

————. See also items 134, 153, 172, 356, 418, 506, 527, 569, 748, 841, 924, 1118, 1138–39, 1202, 1252, 1599, 1610, and 1620.

532 Georgiades, Thrasybulos. *Greek Music, Verse and Dance.* Translated by Erwin Benedikt and Marie L. Martinez. New York: Merlin Press, 1956. 157 p.

533 ————. *Der griechische Rhythmus.* Hamburg: von Schröder, 1949; reprint, Tutzing: Hans Schneider, 1977. 163 p.

534 ————. *Musik und Rhythmus bei den Griechen.* Hamburg: Rowohlt, 1958. 146 p.

535 ————. "Die musikalische Interpretation." *Studium generale* 7 (1954): 389–93.

————. See also item 1611.

Gerlach, Reinhard. See item 650.

Gerstenberg, Walter. See item 1216.

536 Герцман, Евгений. "Античная функциональная теория лада." In *Проблемы музыкальной науки; Сборник статей,* выпуск 5, ред. О. В. Соколов et al., 202-23. Москва: Советский Композитор, 1983.

537 ————. "Античная музыкальная акустика о резонансе." In *Gordon Athol Anderson (1929–1981) in memoriam von seinen Studenten,*

Freunden und Kollegen, 205–10. Henryville, Pennsylvania: Institute of Mediæval Music, 1984.

538 ———. *Античное музыкальное мышление; Исследование.* Ленинград: «Музыка», 1986. 224 p.

539 ———. "Античное учение о мелосе." In *Критика и музыкознание; Сборник статей*, выпуск 3, рец. В. Ю. Григорьев, 114-48. Ленинград: «Музыка», 1987.

540 ———. "Восприятие разновысотных звуковых областей в античном музыкальном мышилении" *Вестник древний истории: Академия наук СССР* 4 (1971): 181-94.

541 ———. "Основные исторические этапы эволюции античного ладового мышления.." In *Научно-методические записки*, ред. и. Абоносимова, 3-13. Владивосток: Дальневосточное книжное издательство, 1975.

542 ———. "'Η παρακαταλογή и три вида звучания." *Acta antiqua academiae scientiarum hungaricae* 26 (1978): 347–59.

543 ———. "Принципы организации «пикнонных» и «апикнонных» структур." In *Вопросы музыковедения; выпуск второй*, 6-26. Государственный музыкально-педагогический институт имени гнесиных. Москва: Министерство културы РСФСР, 1973.

544 ———. "Проблемы античного музыкознания." *Советская музыка* 5 (1983): 103-7.

545 Gevaert, François Auguste. "De l'état actuel de nos conaissances relatives à la pratique de l'art musical chez les Grecs et les Romains." *Revue de l'instruction publique en Belgique* 39 (1896): 218–29.

546 ———. *Histoire et théorie de la musique de l'antiquité.* 2 vols. Gand: Annoot-Braeckman, 1875–81; reprint, Hildesheim: G. Olms, 1965. xvi,450 + xxiii,652 p.

547 ———. *La mélopée antique dans le chant de l'église latine. Suite et complément de l'histoire et théorie de la musique de l'antiquité.* Gand: Ad. Hoste, 1895; reprint, Osnabrück: Zeller, 1967. xxxvi,487 p.

———. See also item 56 and 1304.

548 Giani, Romualdo. *Gli spiriti della musica nella tragedia greca.* Milano: Bottega di poesia, 1924. 146 p.

———. See also item 43.

549 Giani, Romualdo, and Carlo Del Grande. "Relazione melodica di strofe e antistrofe nel coro greco." *Rivista di filologia* n.s. 9 (1931): 185–206.

550 Giannarás, Anastasios. "Das Wachthaus im Bezirk der Musen: Zum Verhältnis von Musik und Politik bei Platon." *Archiv für Musikwissenschaft* 32 (1975): 165–83.
"Festheft für Johannes Lohmann."

———. See also item 868.

551 Giesemann, Paul. "De metro paeonico sive cretico apud poetas graecos." Ph.D. dissertation, Breslau, 1892. 102 p.

552 Gignon, Olof. "Zum antiken Begriff der Harmonie." *Studium generale* 19 (1966): 539–47.

Gildersleeve, Basil L. See items 481 and 741.

553 Gingerich, Owen. "Was Ptolemy a Fraud?" *Quarterly Journal of the Royal Astronomical Society* 21 (1980): 253–66.

Giulio, Maria di. See Di Giulio, Maria.

554 Givry, Grillot de. *Witchcraft, Magic, and Alchemy*. Trans. J. Courtnay Locke. Boston: Houghton Mifflin, 1931; reprint, New York: Dover, 1971. 395 p.

Glarean, Henry. See item 1464.

555 Gleditsch, Hugo. "Metrik der Griechen und Römer mit einem Anhang über die Musik der Griechen neubearbeitet." In *Handbuch der klassischen Altertumswissenschaft,* hrsg. Iwan von Müller II, 63–336. München: C. H. Beck, 1885.

556 Goblot, Edmond. *De musicae apud veteres cum philosophia coniunctione.* Paris: Alcan, 1898. 62 p.

557 Godwin, Joscelyn. *Harmonies of Heaven and Earth.* Rochester, VT: Inner Traditions International, 1987. 208 p.

558 ————. *The Harmony of the Spheres: A Sourcebook of the Pythagorean Tradition in Music.* Rochester, VT: Inner Traditions International, 1993. xiii,495 p.

Gogavino, Antonio. See item 65.

559 Goldschmidt, Viktor. "Die griechische Musik. Seikilos Grablied." In *Materialien zu Musiklehre,* [part 4]:405–80. Heidelberg: Carl Winter, 1924.

560 Goldstein, S. J. "Problems Raised by Ptolemy's Lunar Tables." *Journal for the History of Astronomy* 13 (1982): 195–200.

561 Gombosi, Otto J. "Key, Mode, Species." *Journal of the American Musicological Society* 4 (1951): 20–26.

562 ————. "The Melody of Pindar's Golden Lyre." *Musical Quarterly* 26 (1940): 381–92.

563 ————. "New Light on Ancient Greek Music." In *Papers Read at the International Congress of Musicology, New York 1939,* ed. Arthur Mendel, Gustave Reese, and Gilbert Chase, 168–83. New York: Music Educators' National Conference for the American Musicological Society, 1944.

564 ————. "Studien zur Tonartenlehre des frühen Mittelalters, I." *Acta musicologica* 10 (1938): 149–74.

565 ————. *Die Tonarten und Stimmungen der antiken Musik.* Copenhagen: E. Munksgaard, 1939. xiii,148 p.

566 Gomperz, Theodor. *Zu Philodem's Büchern von der Musik: Ein kritischer Beitrag*. Wien: Hölder, 1885. 40 p.

————. See also item 1173.

Goodwin, Wm. W. See item 1098.

567 Görgemanns, Herwig, and Annemarie Jeanette Neubecker. "'Heterophonie' bei Platon." *Archiv für Musikwissenschaft* 23 (1966): 151–69.

568 Gostoli, Antonietta. "L'armonia frigia nei progetti politico-pedagogici di Platone e Aristotele." In *Mousike: Metrica, ritmica e musica greca in memoria di Giovanni Comotti,* ed. Bruno Gentili and Franca Perusino, 133–44. Pisa: Istituti editoriali e poligrafici internazionali, 1995.

569 ————. "Terpandro e la funzione etico-politica della musica nella cultura spartana del VII sec. a.C." In *La musica in Grecia,* ed. Bruno Gentili and Roberto Pretagostini, 231–37. Storia e società. Roma-Bari: Laterza, 1988.

570 Gottschalk, H. B. "The *De audibilibus* and Peripatetic Acoustics." *Hermes* 96 (1968): 435–60.

Gould, John. See item 1072.

571 Graf, Ernst. *De Graecorum veterum re musica quaestionum capita duo. I. De polyphonia et dialecto crumatica. II. De Pindari re musica.* Marburg: Elwert, 1889. 90 p.

572 ————. *Der Kampf um die Musik im griechischen Altertum.* Gymnasial-Programm Quedlinberg. Leipzig: Fock, 1907. 16 p.

573 ————. "Nomos orthios." *Rheinisches Museum* 43 (1888): 512–23.

574 ————. *Rhythmus und Metrum. Zur Synonymik.* Marburg: Elwert, 1891. iv,97 p.

575 ————. *Die Theorie der Akustik im griechischen Altertum.* Programm des Gymnasiums Gumbinnen. Leipzig: Fock, 1894. 16 p.

576 ————. "Über den Stand der altgriechischen Musikforschung." In *Bericht über den zweiten Kongress der Internationalen Musikgesellschaft zu Basel vom 25.–27. September 1906,* 154–60. Leipzig: Breitkopf und Härtel, 1907.

Grande, Carlo Del. See Del Grande, Carlo.

Granger, Frank. See item 1500.

Grant, Michael. See item 1123.

Greaves, Denise Davidson. See item 1355.

577 Gregor-Dellin, Martin; and Dietrich Mack, eds., *Cosima Wagner's Diaries.* 2 vols. Trans. Geoffrey Skelton. New York: Harcourt Brace Jovanovich, 1978–80. 1199 + 1200 p.

Gregory, David. See item 471.

Gregory, T. See item 1371.

578 Greif, Francisque. "Études sur la musique antique." *Revue des études grecques* 22 (1909): 89–139; 23 (1910): 1–48; 24 (1911): 233–86; 26 (1913): 273–346; 27 (1914): 1–34.

579 Grenfell, Bernard P., and Arthur Surridge Hunt. "IX. Aristoxenus ΡΥΘΜΙΚΑ CΤΟΙΧΕΙΑ," *Oxyrhynchus Papyri* 1 (1898): 14–21 and plate III.

580 Grenfell, Bernard P., and Arthur Surridge Hunt. *The Hibeh Papyri, Part 1.* London: Egypt Exploration Fund, 1906.

See pp. 45–48 and plate V. Additional translations in item 30 (pp. 147–49), 123 (1:184–85), and 1228.

————. See also item 85.

581 Grieser, Heinz. *Nomos: Ein Beitrag zur griechischen Musikgeschichte.* Quellen und Studien zur Geschichte und Kultur des Altertums und des Mittelalters, vol. 5. Heidelberg: Prof. F. Bilabel, 1937. 74 p.

Griffin, Jasper. See item 210.

Григорьев, В. Ю. See item 539.

582 Groningen, Bernard Abraham van. "Àpropos de Terpandre." *Mnemosyne* IV/8 (1955): 177–91.

Gruber, J. G. G. See item 504.

583 Guhrauer, Heinrich. *Altgriechische Program-Musik.* Gymnasial-Programm Wittenberg. Wittenberg: Wattrodt, 1904. 12 p.

584 ————. *Etwas von altgriechischer Musik.* Gymnasial-Programm Wittenberg. Wittenberg: Wattrodt, 1909. 19 p.

585 ————. *Musikgeschichtliches aus Homer.* Gymnasial-Programm Lauban. Lauban, 1886. 24 p.

586 ————. "Über νόμος πολυκέφαλος." In *Verhandlungen der 40. Versammlung deutscher Philologen und Schulmänner Görlitz 1889*, 438–45. Leipzig: B. G. Teubner, 1890.

587 ————. "Zur Frage der Mehrstimmigkeit in der griechischen Musik." In *Philologische Abhandlungen. M. Hertz zum 70. Geburtstage von ehemaligen Schülern dargebracht*, 169–88. Berlin: W. Hertz, 1888.

588 ————. *Zur Geschichte der Aulodik bei den Griechen.* Programm des Gymnasiums Waldenburg im Schlesien. Waldenburg i.S., 1879. 16 p.

I. Begriff und Bedeutung der termini αὐλῳδός und αὐλῳδία. II. Zur Geschichte der Aulodik.

589 ————. "Zur Geschichte der Aulosmusik. Eine Entgegnung." *Jahrbücher für classische Philologie* 121 (1880): 689–705.

Guido of Arezzo. See item 248.

Guillemin, Marcelle. See below and Duchesne-Guillemin, Marcelle.

590 Guillemin, Marcelle, and Jacques Duchesne. "Sur l'origine asiatique de la cithare grecque." *L'Antiquité classique* 4 (1935): 117–24.

Gulick, Charles Burton. See item 97.

591 Günther, Richard. "Richard Wagner und die Antike." *Neue Jahrbücher* 16 (1913): 323–37.

592 Gysin, Hans Peter. *Studien zum Vokabular der Musiktheorie im Mittelalter, eine linguistische Analyse.* Amsterdam: Knuf, 1958. 167 p.

=Ph.D. dissertation, Basel.

593 Haar, James. "Musica Mundana: Variations on a Pythagorean Theme." Ph.D. dissertation, Harvard, 1960. vi,558 p.

594 Haase, Rudolf. "Ein Beitrag Platons zur Tetraktys." *Antaios* 10 (1969): 85–91.

595 ————. "Gehörsdisposition und griechische Skalen." In *Festschrift Karl Gustav Fellerer zum 70. Geburtstag am 7. Juli 1972. Überreicht von Kollegen, Schülern und Freunden,* hrsg. Heinrich Hüschen, 211–18. Musicae scientiae collectanea, vol. 12. Köln: Arno Volk, 1973.

596 ————. *Geschichte des harmonikalen Pythagoreismus.* Publikationen der Wiener Musikakademie, vol. 3. Wien: Elisabeth Lafite, 1969. 184 p.

The section on Greek antiquity ("Das Erbe der Antike") appears on pp. 10–21.

597 ————. "Das pythagoreische Lambdoma." *Grenzgebiete der Wissenschaft* 23 (1974): 361–79.

598 ————. "Eine unbekannte pythagoreische Tafel." *Antaios* 12 (1970): 357–65.

————. See also item 709.

599 Hague, Rebecca. "Ancient Greek Wedding Songs: The Tradition of Praise." *Journal of Folklore Research* 20 (1983): 131–43.

600 Haldane, J. A. "Musical Themes and Imagery in Aeschylus." *Journal of Hellenic Studies* 85 (1965): 33–41.

601 Hall J. "The Nicholson Museum, with Special Reference to Greek Vases in Relation to Music." *The Canon* 4 (1950): 11–17.

Halliday, W. R. See item 20.

602 Hammerstein, Reinhold. *Macht und Klang: Tönende Automaten als Realität und Fiktion in der alten und mittelalterlichen Welt.* Bern: Francke, 1986. 246 p.

Hammond, N. G. L. See item 979.

603 Handschin, Jacques. "Aus der alten Musiktheorie: V. Über einige Sequenz-Zitate." *Acta musicologica* 15 (1943): 15–23.

604 ————. "Die Lehre von der Sphärenharmonie." In *Gedenkschrift Jacques Handschin,* 359–64. Bern: P. Haupt, 1957.

605 ————. "Musikalische Miszellen." *Philologus* 86 (1931): 52–67.

606 ————. "Die Sphärenharmonie in der Geistesgeschichte." In *Gedenkschrift Jacques Handschin,* 365–69. Bern: P. Haupt, 1957.

607 ————. "The Timaeus Scale." *Musica disciplina* 4 (1950): 3–42.

608 ————. *Der Toncharakter.* Zürich: Atlantis, 1948. xvi,436 p.

609 Hannick, Christian. "Antike Überlieferungen in der Neumeneinteilung der byzantinischen Musiktraktate." *Jahrbuch der Österreichischen Byzantinistik* 26 (1977): 169–84.

Hanning, Barbara R. See items 883 and 933.

610 Hansen, Ove. "On the Date and Place of the First Performance of Timotheus' *Persae.*" *Philologus* 128 (1984): 135–36.

611 Hanssen, Friedrich. "Accentus grammatici in metris anacreontico et hemiambico quae sit vis et ratio explicatur." *Philologus* supp. 5 (1885): 197–225.

612 ————. "Das enkomiologische Metrum." *Philologus* 51 (1892): 231–46.

613 ————. "Die sogenannten kyklischen Versfüsse." In *Verhandlungen der 37. Versammlung deutscher Philologen und Schulmänner Dessau 1884*, 213–16. Leipzig: B. G. Teubner, 1885.

614 Harap, Louis. "Some Hellenic Ideas on Music and Character." *Musical Quarterly* 24 (1938): 153–68.

Harmatta, János. See item 1557.

615 Hartlaub, Gustav F. "Musik und Plastik bei den Griechen." *Zeitschrift für Aesthetik* 30 (1936): 135–78.

616 Hasenclever, Richard. *Die Grundzüge der esoterischen Harmonik des Alterthums, im Anschlusse an die Schrift des Frhr. A. v. Thimus über die harmonikale Symbolik des Alterthums dargestellt.* Köln: Du Mont-Schauberg, 1870. iv,47 p.

Reprint, together with Thimus's work, Hildesheim: G. Olms, 1970. See items 1438 and 1524.

617 Haslam, Michael W. ed. "3161 and 3162. Texts with Musical Notation." *Oxyrhynchus Papyri* 44 (1976): 58–72, plates VI–VII.

See also item 935.

618 ————. "3704 and 3705. Texts with Musical Notation." *Oxyrhynchus Papyri* 53 (1986): 41–48 and plates II, IV, VI.

619 ————. "3706. Treatise on Music." *Oxyrhynchus Papyri* 53 (1986): 49–55 and plate VII.

620 ————. "3707. Treatise on Meters." *Oxyrhynchus Papyri* 53 (1986): 56–60 and plate VII.

621 Hauptmann, Moritz. *Die Natur der Harmonik und der Metrik. Zur Theorie der Musik.* Leipzig: Breitkopf und Härtel, 1853. xii,395 p.

622 Havet, L., and Théodore Reinach. "Une ligne de musique antique." *Revue des études grecques* 7 (1894): 196–203.

623 Hawkins, John. *A General History of the Science and Practice of Music.* 5 vols. London: T. Payne and Son, 1776.

Heartz, Daniel. See item 931.

624 Heath, Malcolm. "Receiving the κῶμος: The Context and Performance of Epinician." *American Journal of Philology* 109 (1988): 180–95.

625 Heath, Thomas. *A History of Greek Mathematics.* 2 vols. Oxford: Clarendon, 1921; reprint ed., New York: Dover, 1981. xv,446 + xi,586 p.

626 Heegmann, Alphonse. *Examen de la théorie musicale des Grecs.* Lille: L. Danel, 1852. 79 p.

Hegar, Friedrich. See item 1326.

627 Heiberg, J. L. *Anonymi logica et quadrivium, cum scholiis antiquis.* Det Kgl. Danske Videnskabernes Selskab. Hist.-filol. Meddelelser, vol. 15/1. København: Høst, 1929. xix,144 p.

628 Heinitz, Wilhelm. "Versuch einer Analyse des Berliner Notenpapyrus P. 6870." *Zeitschrift für Musikwissenschaft* 11 (1928–29): 222–33.

629 *Heinrich, Carl Friedrich. *Über den Streit der alten und neuen Musik in Griechenland*. Leipzig, 1801.

630 Heitsch, Ernst. "Drei Helioshymnen." *Hermes* 88 (1960): 139–58.

Helmbold, W. C. See item 1102.

631 Helmholtz, Hermann Ludwig Ferdinand von. *On the Sensations of Tone*. 2d English edition revised and translated by A. J. Ellis. London: Longmans, Green, and Co., 1885; reprint, New York: Dover Publications, 1954. xix,576 p.

Translated from the third (1870) and fourth (1877) German editions, entitled *Die Lehre von den Tonempfindungen*.

632 Henderson, M. Isobel. "Greece." In *Harvard Dictionary of Music*, 2d ed., rev. and enl. by Willi Apel, 351–54. Cambridge: Belknap Press of Harvard University Press, 1969.

Cf. item 120.

633 ————. "The Growth of Ancient Greek Music." *Music Review* 4 (1943): 4–13.

634 ————. "The Growth of the Greek ἁρμονίαι." *Classical Quarterly* 36 (1942): 94–103.

635 ————. "Ancient Greek Music." In *Ancient and Oriental Music*, ed. Egon Wellesz, 336–403. New Oxford History of Music, vol. 1. London: Oxford University Press, 1957.

636 Henderson, W. J. "Criteria in the Greek Lyric Contests." *Mnemosyne* IV/42 (1989): 24–40.

Henry, René. See item 1068.

637 Hephaestion. *Hephaestionis Alexandrini enchiridion*. Ed. Thomas Gaisford. Oxford: Clarendon, 1810. viii,518 p.

Contains part of Aristides Quintilianus.

638 ————. *Enchiridion cum commentariis veteribus*. Ed. M. Consbruch. Leipzig: B. G. Teubner, 1906; reprint, Stuttgart: B. G. Teubner, 1971. xxxiv,430 p.

————. See also items 31 and 665.

639 Heraclides Ponticus. Wehrli, Fritz, ed. *Herakleides Pontikos*. Die Schule des Aristoteles, vol. 7. Basel: Schwabe, 1969. 124 p.

————. See also items 196, 336, 690, 1336, 1369, and 1373.

Herigone, Pierre [Clément Cyriaque de Margin]. See item 469.

640 Herington, John. *Poetry into Drama: Early Tragedy and the Greek Poetic Tradition*. Sather Classical Lectures, vol. 49. Berkeley: University of California Press, 1985. xiv,292 p.

Herlinger, Jan W. See item 1142.

641 Hermann, Conrad. "Zur Theorie des Versmasses." *Jahrbücher für Philologie und Pädagogik* 122 (1880): 65–78.

642 Hermann, Gottfried. "De hymnis Dionysii et Mesomedis." In *Opuscula*, vol. 8, hrsg. Theodore Fritzsche, 343–52. Leipzig: E. Fleischer, 1877. =Programm-Leipzig (1842).

643 Herodotus. *Historiae*. 11 vols. Ed. Ph.-E. Legrand. Paris: Les Belles Lettres, 1930–60. 246 + 204 + 194 + 185 + 201 + 147 + 128 + 235 + 161 + 109 + 246 p.

Hertz, M. See item 587.

Hervetus, Gentianus. See item 1348.

644 Hesiod. *Hesiodi opera*. Ed. F. Solmsen. Scriptorum classicorum bibliotheca Oxoniensis. Oxford: Clarendon, 1970. xxv,246 p.

645 ————. *The Homeric Hymns and Homerica*. Trans. Hugh G. Evelyn-White. Loeb Classical Library. London: William Heinemann, 1914. xlviii,637 p.

646 ————. *The Works and Days, Theogeny, Shield of Herakles*. Trans. Richmond Lattimore. Ann Arbor, MI: University of Michigan Press, 1959. 241 p.

647 Hesychius. *Hesychii Alexandrini lexicon*. 6 vols. in 5. Ed. Mauricius Schmidt. Jena: Mauk, 1858–68; reprint, Amsterdam: Hakkert, 1965. 556 + 566 + 439 + 368 + cxcii,182 + 178 p.

Hett, W. S. See items 59 and 61.

Hickmann, Ellen. See items 186 and 966.

648 Hickmann, Hans. "The Antique Cross-Flute." *Acta musicologica* 24 (1952): 108–12.

649 ————. "Classement et classification des flûtes, clarinettes et hautbois de l'Egypte ancienne." *Chronique d'Egypte* 26 (1951): 17–27.

650 ————. "Der *Skindapsos*. Ein Nachtrag zur Terminologie antiker Saiteninstrumente." In *Speculum musicae artis. Festgabe für Heinrich Husmann zum 60. Geburtstag am 16. Dezember 1968*, hrsg. Heinz Becker und Reinhard Gerlach, 187–91. München: Fink, 1970.

651 ————. "Eine Sonderform des griechischen Sistrums." In *Musa-Mens-Musici. Im Gedenken an Walther Vetter*, hrsg. Heinz Wegener, 27–28. Leipzig: VEB Deutscher Verlag für Musik, 1969.

652 Hieronymus de Moravia. *Tractatus de musica*. Ed. S. M. Cserba. Freiburger Studien zur Musikwissenschaft, vol. 2. Regensburg: Pustet, 1935. lxxxv,293 p.

653 Higgins, R. A., and R. P. Winnington-Ingram. "Lute Players in Greek Art." *Journal of Hellenic Studies* 85 (1965): 62–71.

Highet, Gilbert. See item 708.

654 Hilberg, Isidor. "Über den Gebrauch amphibrachischer Wortformen in der ersten Hälfte des griechischen und lateinischen Hexameters." *Zeitschrift für die Österreichischen Gymnasien* 47 (1896): 865–73.

655 Hilgard, Alfred, ed. *Scholia in Dionysii Thracis artem grammaticam*. Grammatici graeci, I/3. Leipzig: Teubner, 1901; reprint, Hildesheim: Olms, 1979. li,652 p.

Hiller, Edward. See item 1427.

656 Hincks, Marc. Azra. "Le Kordax dans le culte de Dionysos." *Revue archéologique* IV/17 (1911): 1–5.

657 Hipkins, Alfred J. "Dorian & Phrygian." *Sammelbände der Internationalen Musikgesellschaft* 4 (1902–3): 371–81.

658 ————. *Greek Music: A reprint of "Dorian and Phrygian reconsidered from a non-harmonic point of view." To which have been added his last notes on the subject from "Plutarch über die Musik" by R. Westphal, 1865, and "The Modes of Ancient Greek Music" by D. B. Monro, 1894.* N.p.: Printed by Britten & Tanner Ltd., for private circulation, 1930. 45 p.

659 Hirschberg, Leopold C. "Löwe und das klassische Alterthum." *Neue Jahrbücher* 18 (1915): 190–212.

660 Hirzel, Rudolph. "Aristoxenos und Platons erster Alkibiades." *Rheinsiches Musuem* 45 (1890): 419–35.

661 Hoëg, Carsten. *Graesk musik: En kulturhistorisk Skizze.* Kjøbenhavn: P. Branner, 1940. 66 p.

662 ————. "Porphyrios' Kommentar zur Harmonielehre des Ptolemaios, hrsg. Düring." *Gnomon* 10 (1934): 321–22.
Review of item 1125.

663 Hoérée, Arthur. "La musique grecque." *Le Ménestrel* 93 (1931): 409–11.

664 Hoerschelmann, Wilhelm. *Ein griechisches Lehrbuch der Metrik. Literatur-historische Studien.* Akademie Programm für Bologna, Dorpat, 1888. Leipzig: Hinrichs, 1888. 74 p.

665 ————. "Untersuchungen zur Geschichte der griechischen Metriker. Die Composition der Hephaestio-Scholien." *Rheinisches Museum* 36 (1881): 260–301.

666 ————. "Zur Geschichte der antiken Metrik. 1. Διαφοραί." *Philologus* 47 (1889): 1–12.

667 Hoerschelmann, Wilhelm, and Otto Crusius. "Die Betonung des Choliambus." *Philologus* 53 (1894): 214–27.

Hoffleit, H. B. See item 1102.

668 Hoffmann, Karl Johann. *Die Wissenschaft der Metrik.* Leipzig: Hinrichs, 1835. 12 p.
Appendix I: Die antike Rhythmik und Musik in ihrem Verhältnisse zur Metrik.

669 Hoffmann-Erbrecht, Lothar. "Vom Oden der Musen beseelt: Über die Bedeutung der Musik in der griechischen Antike." *Concerto* 3 (1984): 64–73.

670 Holbrook, Amy. "The Concept of Musical Consonance in Greek Antiquity and Its Application in the Earliest Medieval Descriptions of Polyphony." Ph.D. dissertation, University of Washington, 1983. 287 p.

671 Holleman, A. W. J. "The Oxyrhynchus Papyrus 1786 and the Relationship between Ancient Greek and Early Christian Music." *Vigiliae christianae* 26 (1972): 1–17.

672 Holtz, Louis. "Quelques aspects de la tradition et de la diffusion des Institutions." In *Flavio Magno Aurelio Cassiodoro. Atti della settimana di studi su Cassiodoro. Cosenza Squillace, settembre 1983,* 281–312. Squillace: Rubbettino, 1984.

673 Holzer, Ernst. "Zu Philodemos περὶ μουσικῆς." *Philologus* 66 (1907): 498–502.

Holzmann, Wilhelm. See item 1093.

674 Homer. *Ilias*. 2d ed. Ed. and trans. Hans Rupé. Freising: Ernst Heimeran, 1961. 975 p.

675 Hommel, Hildebrecht. "Das Apollonorakel in Didyma. Pflege alter Musik im spätantiken Gottesdienst." In *Festschrift für Friedrich Smend zum 70. Geburtstag dargebracht von Freunden und Schülern,* 7–18. Berlin: Merseburger, 1963.

————. See also item 1583.

676 Horace. *Satires, Epistles and Ars poetica*. Trans. H. Rushton Fairclough. Loeb Classical Library. Cambridge: Harvard University Press, 1929. xxx,509 p.

————. See also items 1112 and 1583.

677 Horna, Konstantin. *Die Hymnen des Mesomedes*. Akademie der Wissenschaften Wien, philologisch-historische Klasse. Sitzungsbericht, 207/1. Wien: Hölder-Pichler-Tempsky, 1928. 40 p.

678 Hornbostel, Erich M. von. "Tonart und Ethos." In *Festschrift für Johannes Wolf zu seinem sechzigsten Geburtstag,* hrsg. W. Lott, H. Osthoff, und W. Wolffheim, 73–78. Berlin: M. Breslauer, 1929.

679 Horowitz, Mindy B. "Modulation and the *Tonoi* According to Aristides Quintilianus." *Theoria* 1 (1985): 84–96.

Hort, Arthur F. See item 1430.

680 Howald, Ernst. "Eine vorplatonische Kunsttheorie." *Hermes* 54 (1919): 187–207.

681 Howard, Albert A. "The Αὐλός or Tibia." *Harvard Studies in Classical Philology* 4 (1893): 1–60.

682 ————. "The Mouth-Piece of the Αὐλός." *Harvard Studies in Classical Philology* 10 (1899): 19.

Huchzermeyer, Hans. See item 686.

683 Huchzermeyer, Helmut. *Aulos und Kithara in der griechischen Musik bis zum Ausgang der klassischen Zeit (nach den literarische Quellen).* Emsdetten: H. und J. Lechte, 1931. 76 p.
=Ph.D. dissertation, Münster, 1930.

684 ————. "Die Bedeutung und Stellung der Musik in der griechischen Tragödie." In *Festschrift 75. Jahre stiftisches humanistisches Gymnasium Mönchen-Gladbach,* 63–71. Mönchen-Gladbach, 1952.

685 ———. "Zur Aufführung antiker Tragödien auf der modernen Bühne." *Neue Zeitschrift für Musik* 123 (1962): 492–97.

686 Huchzermeyer, Helmut, and Hans Huchzermeyer. "Die Bedeutung des Rhythmus in der Musiktherapie der Griechen von der Frühzeit bis zum Beginn des Hellenismus." *Sudhoffs archivalische Zeitschrift für Wissenschaftsgeschichte* 58 (1974): 113–48.

687 Huffman, Carl A. "The Authenticity of Archytas Fr. 1." *Classical Quarterly* n. s. 35 (1985): 344–48.

Hughes, David W. See items 186 and 966.

688 Huglo, Michel. "Die *Musica Isidori* nach den Handschriften des deutschen Sprachgebietes." In *Mittelalterliche Musiktheorie in Zentraleuropa*, ed. Walter Pass and Alexander Rausch, 79–86. Musica mediaevalis europae occidentalis, vol. 4. Tutzing: Hans Schneider, 1998.

689 ———. "The Study of Ancient Sources of Music Theory in the Medieval Universities." In *Music Theory and Its Sources: Antiquity and the Middle Ages*, ed. André Barbera, 150–72. Notre Dame, Indiana: University of Notre Dame Press, 1990.

690 Hultsch, Friedrich. "Das astronomische System des Herakleides von Pontos." *Jahrbücher für classische Philologie* 153 (1896): 305–16.

691 Humphreys, Milton Wylie. "Elision, Especially in Greek." *Transactions of the American Philological Association* 9 (1878): 84–97.

692 ———. "On Certain Effects of Elision." *Transactions of the American Philological Association* 10 (1879): 32–60.

693 ———. "On the Nature of Caesura." *Transactions of the American Philological Association* 10 (1879): 25–31.

694 Hunger, Herbert, and Egert Pöhlmann. "Neue griechische Musikfragmente aus ptolemäisches Zeit in der Papyrussammlung der Österreichischen Nationalbibliothek." *Wiener Studien* 75 (1962): 51–78.

"Festschrift für Walther Kraus zum 60. Geburtstage."

Hunt, Arthur Surridge. See items 85, 579, and 695.

695 Hunt, Arthur Surridge, and H. S. Jones. "1786. Christian Hymn with Musical Notation." *Oxyrhynchus Papyri* 15 (1922): 21–25.

Hüschen, Heinrich. See item 595 and 1226.

696 Husmann, Heinrich. "Antike und Orient in ihrer Bedeutung für die europäische Musik." In *Kongressbericht der Gesellschaft für Musikforschung, Hamburg, 1956*, 24–33. Kassel: Bärenreiter, 1957.

697 ———. *Grundlagen der antiken und orientalischen Musikkultur*. Berlin: W. de Gruyter, 1961. 213 p.

698 ———. "Olympos, die Anfänge der griechischen Enharmonik." *Jahrbuch der Musikbibliothek Peters* 44 (1938): 29–44.

699 ———. "Zu Metrik und Rhythmik des Mesomedes." *Hermes* 83 (1955): 231–36.

———. See also item 650.

Hussey, Joan. See item 1024.

700 Huxley, G. "A Note on a Seven-Stringed Lyre." *Journal of Hellenic Studies* 90 (1970): 196–97.

701 Idelsohn, Abraham Zevi. *Jewish Music in Its Historical Development.* New York: Henry Holt and Co., 1929. xi,535 p.

Illmer, Detlef. See item 199.

702 Ioannides, Kleiton. "L'Ethos musical chez Platon." *Philosophia* 15/16 (1985–86): 254–65.

703 ————. *Ρυθμὸς καὶ άρμονία: ἡ μύσία τῆς μουσικῆς καὶ τοῦ χοροῦ στὴν Πλατωνικὴ παιδεία.* Λευκωσία, 1973. 102 p.
2d ed., 1978. 100 p.

704 Irigoin, Jean. *Histoire du texte de Pindare.* Paris: Klincksieck, 1952. xiii,462 p.

Irmscher, Johannes. See item 1219.

705 Isidore of Seville. "Isidore of Seville, from the *Etymologies.*" In *Strunk's Source Readings in Music History,* vol. 2, *The Early Christian Period and the Latin Middle Ages,* ed. James McKinnon, 37–43. New York: Norton, 1998.

706 Issberner, Reinhold. "Dynamis und Thesis." *Philologus* 55 (1896): 541–60.

707 Jaeger, Werner. "Diokles von Karystos und Aristoxenos von Tarent über die Prinzipien." In *EPMHNEIA: Festschrift Otto Regenbogen,* 94–103. Heidelberg: Winter Univ. Verlag, 1952.

708 ————. *Paideia: Die Formung des griechischen Menschen.* 2d ed. Berlin: W. de Gruyter, 1936. 513 p.
English translation: *Paideia: The Ideals of Greek Culture.* 3 vols. Trans. Gilbert Highet. New York: Oxford University Press, 1945.

Jahn, Albert. See item 46.

709 Jahoda, Gerhard. "Die Tonleiter des *Timaios*—Bild und Abbild." In *Festschrift Rudolf Haase,* hrsg. Werner Schulze, 43–80. Eisenstadt: Elfriede Rötzer, 1980.

710 Jammers, Ewald. "Rhythmische und tonale Studien zur Musik der Antike und des Mittelalters." *Archiv für Musikforschung* 6 (1941): 94–115 and 151–81.

711 Jan, Karl von. "Auletischer und aulodischer Nomos." *Jahrbücher für classische Philologie* 119 (1879): 577–92.

712 ————. "Aulos und Nomos." *Jahrbücher für classische Philologie* 123 (1881): 543–52.

713 ————. "De fidibus graecorum." Ph.D. dissertation, Berlin, 1859. 44 p. + plate.

714 ————. "Die Griechen bliesen nicht auf einfachen, sondern auf doppelten Auloi." In *Verhandlungen der 34. Versammlung deutscher Philologen und Schulmänner Trier 1879,* 157–61. Leipzig: B. G. Teubner, 1880.

715 ————. "Die griechischen Flöten." *Allgemeine musikalische Zeitung* 16 (1881): 465–70, 481–88, and 497–502.

716 ————. "Die griechische Musik, I: Die Harmonik des Aristoxenos." *Philologus* 29 (1870): 300–318.

717 ————. "Die griechische Musik, II: Die Excerpte aus Aristoxenos." *Philologus* 30 (1871): 398–419.

718 ————. *Die griechischen Saiteninstrumente. Mit 6 Abb. in Zinkätzung.* Programm des Gymnasiums Saargemünd. Leipzig: B. G. Teubner, 1882. 36 p.

719 ————. "Die Handschriften der Hymnen des Mesomedes." *Neue Jahrbücher* 141 (1890): 679–88.

720 ————. "Die Harmonie der Sphären." *Philologus* 52 (1894): 13–37.

721 ————. *Die Harmonik des Aristoxenianers Kleoneides.* Landsberg: Schäffer, 1870. 23 p.

722 ————. "Die Metrik des Bacchius." *Rheinisches Museum* 46 (1891): 559–76.

723 ————. *Musici scriptores graeci. Aristoteles. Euclides. Nicomachus. Bacchius, Gaudentius. Alypius et melodiarum veterum quidquid exstat.* Recognovit prooemiis et indice instruxit Carolus Janus. Annexae sunt 2 tabulae. Leipzig: B. G. Teubner, 1895; reprint, Hildesheim: G. Olms, 1962. xciii,503 p. + 1 table and 1 plate.

See also items 1591 and 1617.

724 ————. *Musici scriptores graeci. Supplementum melodiarum reliquiae.* Leipzig: B. G. Teubner, 1899; reprint, Hildesheim: G. Olms, 1962. 61 p.

725 ————. "Die Musikinstrumente der Griechen und Römer." In *Festgaben zum 25jährigen Jubiläum des Gymnasiums und Realgymnasiums zu Landsberg a. W. dargebracht von ehemaligen Lehren und Schülern,* 24–30. Landsberg a. W.: F. Schoeffer, 1885.

726 ————. "Neue Sätze aus der Rhythmik des Aristoxenus." *Berliner philologische Wochenschrift* 19 (1899): 475–79 and 508–11.

727 ————. "Ein neuer musikalischer Fund aus dem alten Griechenland." *Berliner philologische Wochenschrift* 15 (1895): 1339–40.

728 ————. "Der pythische Nomos und die Syrinx." *Philologus* 38 (1879): 378–84.

729 ————. "Sendschrieben an Westphal." *Berliner philologische Wochenschrift* 6 (1886): 1134–35 and 1166–67.

730 ————. "Die Tonarten bei Platon in dritten Buche der Republik." *Jahrbücher für Philologie und Pädagogik* 95 (1867): 815–26.

731 ————. "Zu Aristides Quintilianus." *Jahrbücher für Philologie und Pädagogik* 81 (1860): 549–55.

————. See also items 25, 55, 108–10, 330, 473, 522, and 1012.

732 Jannot, Jean René. "L'Aulos étrusque." *L'Antiquité classique* 43 (1974): 118–42.

733 ————. "La lyre et la cithare: Les instruments à cordes de la musique Etrusque." *L'Antiquité classique* 48 (1979): 469–507.

734 Janssens, A. J. "Aristoteles en de oudere muziekaesthetiek." *Philologische Studien* 6 (1934–35): 108–32.

735 ————. "Die muziekaesthetische Papyrus von Hibeh." *Philologische Studien* 11–12 (1939–40): 90–111.

736 ————. "De Muziekpsycholoog Damon van Oa." *Tijdschrift voor Philosophie* 3 (1941): 499–566 and 649–712.

737 Jenkins, Ian. *Greek and Roman Life.* Cambridge: Harvard University Press, 1986. 72 p.

738 John, Hans. "Die griechische Musikerziehung während des Hellenismus und der Kaiserzeit." In *Musa-Mens-Musici. Im Gedenken an Walther Vetter,* hrsg. Heinz Wegener, 29–32. Leipzig: VEB Deutscher Verlag für Musik, 1969.

739 ————. "Die Musikerziehung im antiken Griechenland und ihre Aktualität für unsere Zeit." Ph.D. dissertation, Berlin, 1961. 138 p.

740 Johner, Dominikus. "Die älteste entzifferte christliche Melodie." *Benediktinische Monatschrift* 5 (1923): 148–54.

741 Johnson, Charles W. L. "The Motion of the Voice in Connection with Accent and Accentual Arsis and Thesis." In *Studies in Honor of Basil L. Gildersleeve,* 57–76. Baltimore, Maryland: Johns Hopkins Press, 1902).

742 ————. "The Motion of the Voice in the Theory of Ancient Music." *Transactions of the American Philological Association* 30 (1899): 42–55.

743 ————. "Musical Pitch and the Measurement of Intervals among the Ancient Greeks." Ph.D. dissertation, Johns Hopkins, 1896. vi,76 p.

Johnson, Richard. See item 915.

744 Jones, Edward. "A Short Dissertation on the Origin of the Ancient Greek Music." In *Lyric Airs,* 3–24. London: By the author, 1804.

Jones, H. S. See item 695.

Jones, W. H. S. See item 1044.

Jonker, G. H. See item 260.

Jortin, J. See item 103.

745 Josephus. *Flavii Josephi Opera. Graece et latine.* Ed. Wilhelm Dindorf. Scriptorum graecorum bibliotheca, vols. 21, 27. Paris: Firmin Didot, 1845-47. ii,833 + xiv,476 p.

746 Joubert de La Salette, Pierre Jean. *Considérations sur les divers systèmes de la musique ancienne et moderne, et sur le genre enharmonique des Grecs.* 2 vols. Paris: Goujon, 1810. xxxviii,443 + 436 p.

747 Jourdan-Hemmerdinger, Denise. "La date de la 'notation vocale' d'Alypios." *Philologus* 125 (1981): 299–303.

748 ————. "L'Epigramma di Pitecusa e la musica della Grecia antica." In *La musica in Grecia*, ed. Bruno Gentili and Roberto Pretagostini, 145–82. Storia e società. Roma-Bari: Laterza, 1988.

749 ————. "Le nouveau papyrus d'Euripide: Qu'apporte-t-il à la théorie et à l'histoire de la musique?" In *"Les Sources en musicologie": Orléans 9–11 Septembre 1979. Actes*, 35–65. Paris: CNRS, 1981.

750 ————. "Un nouveau papyrus musical d'Euripide (présentation provisoire)." *Comptes rendus de l'Académie des Inscriptions et Belles-Lettres* (1973): 292–302.

751 Jullien, Bernard. *De quelques points des sciences dans l'antiquité physique, metrique, musique.* Paris: Hachette, 1854. viii,512 p.
See also item 1497.

752 Junge, G. "Die Sphärenharmonie und die pythagoreisch-platonische Zahlenlehre." *Classica et mediaevalia* 9 (1947): 183–94.

753 Jusatz, Carolus Hugo. "De irrationalitate studia rhythmica." *Leipziger Studien zur classische Philologie* 14 (1893): 173–351.

754 Jüthner, Julius. "Terpanders Nomengliederung." *Wiener Studien* 14 (1892): 1–17.

755 Kaba, Melinda. *Die römische Orgel von Aquincum (3. Jahrhundert).* Musicologica hungarica, Veröffentlichungen des Musikwissenschaftliches Institut in Budapest, vol. 6. Budapest: Akadémiai, 1976. 144 p.

756 Kaden, Christian. "Die Stellung der Berufsmusiker in der Gesellschaft des antiken Griechenland." *Beiträge zur Musikwissenschaft* 11 (1969): 47–66.

757 Kahl, Alexis. "Die Philosophie der Musik nach Aristoteles." Ph.D. dissertation, Leipzig, 1902. 47 p.

Kaibel, George. See item 96.

758 Kaimio, Maarit. "Music in the Homeric Hymn to Hermes." *Arctos: Acta philologica Fennica* 8 (1974): 29–42.

759 Kalkner, Friedrich. *Symbolae ad historiam versuum logaoedicorum.* Marburg: Elwert, 1892. 52 p.

760 Kallenbach-Greller, Lotte. "Die historischen Grundlagen der Vierteltöne." *Archiv für Musikwissenschaft* 8 (1926): 473–85.

761 Kalomiris, Manolis. "L'Évolution de la musique grecque." *Le ménestrel* 100 (1938): 61, 69–70, and 77–78.

Kämmel, Julius. See item 783.

762 Karakassis, Stavros. 'Ελληνικὰ μουσικὰ ὄργανα (ἀρχαία, Βυζαντινά, συγχρόνα). Athens: Difros, 1970. 214 p.

Kárpáti, András. See item 476.

Karson, Burton L. See item 936.

763 Kartomi, Margaret J. *On Concepts and Classifications of Musical Instruments.* Chicago Studies in Ethnomusicology. Chicago: University of Chicago Press, 1990. xix,329 p.

764 Katagiri, Isao. "Aristoxenus to yondo—Aristoxenus ongaku ririon ni kansuru ichi kösatsu." M.A. dissertation, Tokyo University of Fine Arts and Music, 1976. 222 p.

765 ————. "Aristoxenus to yondo—Aristoxenus ongaku ririon ni kansuru ichi kösatsu." *Ongaku gaku* 23 (1977): 101–15.

766 ————. "Ptolemaios ni okeru tentai no harmonia—kanzenonsoshiki tono kankei o chushin ni." *Bulletin of Elisabeth University of Music* 1 (1981): 1–12.

767 ————. "Ptolemaios ongaku—riron ni okeru kyowa-on 11do no mondai." *Ongaku gaku* 25 (1979): 1–10.

768 Kauer, Robert. "Die sogenannten Neumen im Codex Victorianus des Terenz." *Wiener Studien* 26 (1904): 222–27.

769 Kayser, Hans. *Paestum: Die Nomoi der drei altgriechischen Tempel.* Heidelberg: L. Schneider, 1958. 93 p.

770 Kazhdan, A. P., and Ann Wharton Epstein. *Change in Byzantine Culture in the Eleventh and Twelfth Centuries.* The Transformation of the Classical Heritage, vol. 7. Berkeley: University of California Press, 1985. xxii,287 p.

771 Keeble, John. *The Theory of Harmonics, or, an Illustration of the Grecian Harmonica. In two parts: I. As it is maintained by Euclid, Aristoxenus, and Bacchius Senior. II. As it is established on the doctrine of the ratio: in which are explained the two diagrams of Gaudentius, and the Pythagorean numbers in Nicomachus.* London: Printed for the author, 1784. 203,xxiii p.

772 Keil, Heinrich. *Analecta grammatica.* Programm des Königlichen Pädagogiums in Halle. Halle: Druck der Waisenhaus-Buchdruckerei, 1848. 38 p.

773 ————. *Grammatici Latini.* 8 vols. Leipzig: B. G. Teubner, 1855–80; reprint, Hildesheim: Olms, 1961. lx,610 + xxxviii,597 + xii,602 + lv,615 + 687 + xxviii,672 + 676 + cclxi,399 p.

Kemke, Ioannes. See item 1063.

774 Kemp-Lindemann, Dagmar. *Darstellungen des Achilleus in griechischer und römischer Kunst.* Archäologische Studien, vol. 3. Bern: Lang, 1975.

775 Keuls, Eva. "The Apulian 'Xylophone': A Mysterious Musical Instrument Identified." *American Journal of Archaeology* 83 (1979): 476–77.

Keyes, Clinton Walker. See item 321.

776 Keys, C. A. "The Word Symphony." *Classica et mediaevalia* 30 (1969): 578–94.

777 Khalil, Ann Knudsen. "Musicians and Music." In *The Muses at Work: Arts, Crafts, and Professions in Ancient Greece and Rome,* 226–49. Cambridge: Massachusetts Institute of Technology Press, 1969.

778 Kieckhefer, Richard. *Magic in the Middle Ages.* Cambridge Medieval Textbooks. Cambridge: Cambridge University Press, 1989. x,219 p.

779 Kiesewetter, Raphael Georg. *Geschichte der europäisch-abendländischen oder unserer heutigen Musik: Darstellung ihres Ursprungs, ihres Wachstumes und ihrer stufenweise Entwickelung; von dem ersten Jahrhundert des Christentumes bis auf unsere Zeit.* Leipzig: Breitkopf und Härtel, 1834. viii,116 p.

Kilmer, Anne Draffkorn. See item 256.

780 Kinkeldey, Otto. "The Music of the Spheres." *Bulletin of the American Musicological Society* 11–13 (1948): 30–32.

781 Kircher, Athanasius, S.J. *Musurgia universalis.* 2 vols. Romae, ex typographia hæredum Francisci Corbelletti, 1650. 690 p.

————. See also items 23, 1247–48, and 1527.

782 Klein, W. "Platos Musikphilosophie." *Das Reich* 3 (1918): 16–20.

Klek, Joseph. See item 58.

783 Klotz, Richard. "De numero dochmiaco observationes. De carminum dochmiacorum compositione." In *Festschrift des Gymnasiums zur Feier des 25jährigen Amtjubiläums des Direktors Julius Kämmel,* 34–41. Zittau: B. G. Teubner, 1879.

784 ————. "De numero dochmiaco observationes. Secunda pars. De carminum dochmiacorum compositione." In *Programm des Gymnasiums zur Justischen Gestiftsfeier,* 3–10. Zittau: B. G. Teubner, 1879.

785 ————. *De numero dochmiaco observationes.* Leipzig: B. G. Teubner, 1881. 42 p.

786 Knitterscheid, Emil. "Musikinstrumente auf antiken Münzen." *Mitteilungen für Münzsammler* 6 (1929): 310–15.

Knoellinger, H. See item 58.

787 Koch, Bernhard. *Der Rhythmus: Untersuchungen über sein Wesen und Wirken in Kunst und Natur und seine Bedeutung für die Schule.* Langensalza: H. Beyer und Söhne, 1922. 90 p.

= Ph.D. dissertation, Münster, 1920.

788 Koch, Hans Albrecht. "Protagoras bei Platon, Aristoteles, und Sextus Empiricus." *Hermes* 99 (1971): 278–82.

789 Koenen, Ludwig. "Notes on Papyri." *Bulletin of the American Society of Papyrologists* 16 (1979): 109–16.

Reports on *P.Mich.* Inv. 4682: Rules for Musical Contests. See also item 1045.

790 Koller, Ernst. "Musse und musische Paideia." *Museum helveticum* 13 (1956): 1–37 and 94–124.

791 Koller, Hermann. "'Εγκύκλιος παιδεία," *Glotta* 34 (1955): 174–89.

792 ————. "Das kitharodische Prooimion." *Philologus* 100 (1956): 159–206.

793 ————. *Die Mimesis in der Antike.* Bern: Francke, 1954. 235 p.

794 ————. *Musik und Dichtung im alten Griechenland.* Bern: Francke, 1963. 212 p.

795 ————. "Die Parodie." *Glotta* 35 (1956): 17–32.

796 ————. "Stoicheion." *Glotta* 34 (1955): 161–74.

797 ———. "Zum Aufsatz über Harmonie und Tetraktys." *Museum helveticum* 17 (1960): 115–17.

Kopff, E. Christian. See item 500.

798 Kornerup, Thorwald. *Akustische Gesetze für die Akkord- und Skalabildung*. Kopenhagen: Levin & Munksgaard, 1930. 126 p.

799 Körte, A. "Pherekrates." *Real-Enzyklopädie der klassischen Altertumswissenschaft* 38 (1938): 1985–91.

800 Koster, Willem John Wolff. "De studiies recentibus ad rem metricam pertinentibus." *Mnemosyne* IV/3 (1950): 27–29.

801 ———. "Quelques remarques sur l'étude de rythmique Ox. Pap. 2687(9)." *Revue des études grecques* 85 (1972): 47–56.

See also items 80, 87, 529, 1160, and 1253.

802 ———. *Rhythme en metrum bij de Grieken van Damon tot Aristoxenus*. Groningen: Wolters, 1940. 34 p.

803 Král, Josef. "O některých otázkách z oboru rhythmiky a metriky antické." *Listy filologické* 14 (1887): 321–34.

804 ———. "O novějšich řeckých nálezech hudebních." *Listy filologické* 23 (1896): 33–50.

805 ———. "Nový řecký nález hudební." *Listy filologické* 23 (1896): 178–86.

806 Kralik, Richard von. *Altgriechische Musik, Theorie, Geschichte und sämtliche Denkmäler*. Stuttgart: J. Roth, 1900. 52 p.

807 Krauland, Andreas. "Nomos, Hymnus und Prooemium." Ph.D. dissertation, Graz, 1908. 174 p.

808 Kraus, Walther. "Die Auffassung des Dichterberufs im frühen Griechentum." *Wiener Studien* 68 (1955): 65–87.

———. See also item 694.

809 Krausse, Bernhard Rudolf. "Studie zur altchristlichen Vokalmusik in der griechischen und lateinischen Kirche und ihr Zusammenhang mit der altgriechischen Musik." Ph.D. dissertation, Leipzig, 1892. 51 p.

810 Krenek, Ernst. "Proportionen und pythagoräische Hämmer." *Musica* 14 (1960): 708–12.

Krevelen, Dirk Andree van. See item 1064.

811 Krüger, Eduard. *Dissertatio de musicis graecorum organis circa Pindari tempora florentibus*. Göttingen: Dietrich, 1830. 36 p.

812 ———. "Griechische Musik." *Philologus* 31 (1872): 348–51.

813 ———. "Φωνῆς πτῶσις ἐπὶ μίαν τάσιν." *Philologus* 31 (1872): 348–50.

Kruse, Heinrich. See item 1562.

814 Kuba, Ludvik. "A Greek Musical Composition of the Third Century, B.C." *Music* 11 (1897): 398–402.

Kuch, Heinrich. See items 1205 and 1212.

815 Kucharski, P. "La musique et la conception du réel dans le 'Philèbe.'" *Revue philosophique* 141 (1951): 39–59.

816 ————. "Le 'Philèbe' et les 'Éléments harmoniques' de Aristoxène." *Revue philosophique* 149 (1959): 41–72.

817 Kuhn, Friderichus. "Symbolae ad doctrinae περὶ διχρόνων historiam pertinentes. Part. I." Ph.D. dissertation, Breslau, 1892. 36 p.

818 ————. *Symbolae ad doctrinae περὶ διχρόνων historiam pertinentes. Accedit appendix. 1. De Ignatii Diaconi senariorum in Adamum memoria. 2. De Ignatii Diaconi, Theodosii Diaconi, Christophori mytilenaei, Joannis Euchaitensis legibus metricis.* Breslauer philologische Abhandlungen, VI/3. Breslau: Koebner, 1892. 140 p.

819 Kuiper, K. "Woord en lied." In *Willem Mengelberg. Gedenkboek 1895–1920,* 135–38. 's-Gravenhage: Nijhoff, 1920.

820 Künssberg, Hans. "Über eine mathematisch-geographische Stelle bei 'Theon.'" *Blätter für das bayerische Gymnasialschulwesen* 20 (1884): 368–72.

Kunst, Jaap. See item 1298.

821 Kuttner, Fritz A., and J. Murray Barbour. *The Theory of Classical Greek Music.* Musurgia Records: Theory Series A #1. 31 p. + 1 disc.

822 Kutznitzky, Hans. "Revue und Musik im Altertum." *Der Auftakt* 8 (1928): 186–91.

823 Kytzler, Bernhard. "Die Weltseele und der musikalische Raum (Platons *Timaios* 35a ff.)." *Hermes* 87 (1959): 393–414.

La Croix, Richard R. See item 502.

824 La Fage, Adrien de. "Aristoxène et son école." *Revue et gazette musicale de Paris* 24 (1857): 110–12, 156–58, and 163–64.

LaRue, Jan. See item 366 and 859.

825 Lachmann, Robert. *Musik des Orients.* Breslau: Ferd. Hirt, 1929. 136 p.

826 ————. "Die Weise vom Löwen und der pythische Nomos." In *Festschrift für Johannes Wolf zu seinem sechzigsten Geburtstag,* hrsg. W. Lott, H. Osthoff, und W. Wolffheim, 97–106. Berlin: M. Breslauer, 1929.

827 Laloy, Louis. "Anciennes gammes enharmoniques." *Revue de philologie* 23 (1899): 238–48; 24 (1900): 31–43.

828 ————. "Le genre enharmonique des Grecs." In *Congrès international d'histoire de la musique tenu à Paris 1900,* ed. Jules Combarieu, 39–56. Solesmes: Imprimerie Saint-Pierre, 1901.

829 ————. "Un passage d'Euclide mal interprété." *Revue de philologie* 24 (1900): 236–41.

830 ————. "Quels sont les accords cités dans le ch. XIX du περὶ μουσικῆς?" *Revue de philologie* 23 (1899): 132–40.

————. See also item 83.

Lamb, George. See item 910.

Lamb, W. R. M. See item 1089.

831 *Landels, J. G. "Ancient Greek Musical Instruments of the Woodwind Family." Ph.D. Dissertation, Hull, 1961.

832 ———. "The Brauron Aulos." *Annual of the British School at Athens* 58 (1963): 116–19.

833 ———. "Fragments of Auloi Found in the Athenian Agora." *Hesperia* 33 (1964): 392–400 and plate 70.

834 ———. "Music in Ancient Greece." *Proceedings of the Classical Association* 77 (1980): 24.

834a ———. *Music in Ancient Greece and Rome.* London: Routledge, 1999. xii,296 p.

835 ———. "A Newly Discovered Aulos." *Annual of the British School at Athens* 63 (1968): 231–38 and plate 55.

836 ———. "The Reconstruction of Ancient Greek *Auloi.*" *World Archaeology* 12 (1981): 298–302.

837 ———. "Ship-shape and *Sambuca*-fashion." *Journal of Hellenic Studies* 86 (1966): 69–77.

838 Lang, Carl. "Über altgriechischen Musik." *Nord und Süd* 13 (1880): 107–23.

Lang, Paul Henry. See item 898.

839 Langloys, Yves. *L'Éducation des enfants par la musique d'après Platon.* 2d ed. Paris: Schola Cantorum, 1914. 54 p.

840 Laroche, Emmanuel. *Histoire de la racine nem- en grec ancien.* Collection études et commentaires, vol. 6. Paris: Klincksieck, 1950. 282 p.

841 Lasserre, François. "Musica babilonese e musica greca." In *La musica in Grecia,* ed. Bruno Gentili and Roberto Pretagostini, 72–95. Storia e società. Roma-Bari: Laterza, 1988.

———. See also item 1104.

842 Latte, K. "Zur Geschichte der griechischen Tragödie in der Kaiserzeit." *Eranos* 52 (1954): 125–27.

Lattimore, Richmond. See item 646.

843 Lawler, Lillian B. *The Dance in Ancient Greece.* London: A. & C. Black, Middletown, Conn.: Wesleyan University Press, 1964; reprint, Seattle: University of Washington Press, 1967. 160 p.

Lawlor, Robert and Deborah. See item 1429.

844 Lawergren, Bo. "The Cylinder Kithara in Etruria, Greece, and Anatolia." *Imago musicae* 1 (1984): 147–74.

Legrand, Ph.-E. See item 643.

845 Lehmann, Günther. *Theorie und Geschichte der griechischen Harmonik in der Darstellung durch August Boeckh.* Würzburg: R. Mayr, 1935. lvii,112 p.

846 Leichsening, Oskar. *De metris graecis quaestiones onomatologae.* Leipzig: Fock, 1888. 46 p.
=Ph.D. dissertation, Griefswald.

847 Leo, Friedrich. "Die beiden metrischen Systeme des Alterthums." *Hermes* 24 (1889): 280–301.

848 Letters, Richard J. "The Scales of Some Surviving ΑΥΛΟΙ." *Classical Quarterly* n. s. 19 (1969): 266–68.

849 Levin, Flora R. *The Harmonics of Nicomachus and the Pythagorean Tradition*. American Classical Studies, no. 1. University Park, Penn.: The American Philological Association, 1975. xi,113 p.

850 ———. "The Hendecachord of Ion of Chios." *Transactions of the American Philological Association* 92 (1961): 295–307.

851 ———. "Music in Ancient Greek Drama." In *Oedipus Rex: A Mirror for Greek Drama*, ed. Albert Spaulding Cook, 4–8. Wadsworth Guides to Literary Study. Belmont, California: Wadsworth, [c1963].

852 ———. "πληγή and τάσις in the Harmonika of Klaudios Ptolemaios." *Hermes* 108 (1980): 205–29.

853 ———. "*Synesis* in Aristoxenian Theory." *Transactions of the American Philological Association* 103 (1972): 211–34.

854 ———. "Unity in Euclid's 'Sectio canonis.'" *Hermes* 118 (1990): 430–43.

———. See also items 1013 and 1016.

Lewis, D. M. See item 1072.

855 Liess, Andreas. "Zum Ursprung der *Orchestra*, ein hypothetischer Entwurf." In *Symbolae historiae musicae. Hellmut Federhofer zum 60. Geburtstag. Überreicht von Freunden, Kollegen und Schülern*, hrsg. Friedrich Wilhelm Riedel und Hubert Unverricht, 19–27. Mainz: Schott, 1971.

Liliencron, Rochus von. See items 4 and 1288.

856 Lindberg, David C. "The Transmission of Greek and Arabic Learning to the West." In *Science in the Middle Ages*, ed. David C. Lindberg, 52–90. The Chicago History of Science and Medicine. Chicago: University of Chicago Press, 1978.

857 Lippman, Edward A. "Hellenic Conceptions of Harmony." *Journal of the American Musicological Society* 16 (1963): 3–35.

858 ———. *Musical Thought in Ancient Greece*. New York: Columbia University Press, 1964; reprint, New York: Da Capo, 1975. xiii,215 p.

859 ———. "The Place of Music in the System of Liberal Arts." In *Aspects of Medieval and Renaissance Music. A Birthday Offering to Gustave Reese*, ed. Jan LaRue *et al.*, 545–59. New York: Norton, 1966.

860 ———. "The Sources and Development of the Ethical View of Music in Ancient Greece." *Musical Quarterly* 49 (1963): 188–209.

861 List, George. "The Boundaries of Speech and Song." *Ethnomusicology* 7 (1963): 1–16.

862 Litchfield, Malcolm. "Aristoxenus and Empiricism: A Reevaluation Based on His Theories." *Journal of Music Theory* 32 (1988): 51–73.

863 Lloyd, G. E. R. *Early Greek Science: Thales to Aristotle*. Ancient Culture and Society. New York: Norton, 1970. [xvi],156 p.

864 ———. *Greek Science after Aristotle*. Ancient Culture and Society. New York: Norton, 1973. xv,189 p.

Locke, J. Courtnay. See item 554.

865 Löhbach, Rudolf. "Der goldene Schnitt im Hexameter." *Jahrbücher für classische Philologie* 119 (1879): 692.

866 Lohmann, Johannes. "Die Geburt der Tragödie aus dem Geiste der Musik." *Archiv für Musikwissenschaft* 37 (1980): 167–86.

867 ————. "Die griechische Musik als mathematische Form." *Archiv für Musikwissenschaft* 14 (1957): 147–55.

868 ————. *Musiké und Logos: Aufsätze zur griechischen Philosophie und Musiktheorie zum 75. Geburtstag des Verfassers am 9. Juli 1970.* Hrsg. Anastasios Giannarás. Stuttgart: Musikwissenschaftliche Verlags-Gesellschaft, 1970. xv,129 p.

869 ————. "Der Ursprung der Musik." *Archiv für Musikwissenschaft* 16 (1959): 148–73, 261–91, 400–403.

————. See also items 550 and 1230.

870 Loizides, Roger. *'Η μουσικὴ καὶ ὁ χορὸς ἀρχαία Σπάρτη. Χρυχὲς τῆς ζωῆς τῶν Δωριεῶν.* Nicosia: Radio Corporation of Cyprus, 1971. 157 p.

871 Longman, G. A. "The Musical Papyrus: Euripides, *Orestes* 332–40." *Classical Quarterly* n. s. 12 (1962): 61–66.

872 López, J. García. "Sobre el vocabulario etico-musical del Griego." *Emerita, boletín de linguística y filología clásica* 37 (1969): 335–52.

873 Lord, Carnes. *Education and Culture in the Political Thought of Aristotle.* Ithaca: Cornell University Press, 1982. 226 p.

874 ————. "On Damon and Music Education." *Hermes* 106 (1978): 32–43.

875 ————. "A Peripatetic Account of Tragic Music." *Hermes* 105 (1977): 175–79.

Lott, W. See items 678 and 826.

876 Lucan, Louis. *Une revolution dans la musique: essai d'application, à la musique, d'une théorie philosophique.* Paris: Paulin et Lechevalier, 1849. xxx,326 p.

The *Sectio canonis* is translated into French on pp. 266–82.

877 Ludwich, Arthur. "Die Betonung des Hinkiambus." *Berliner philologische Wochenschrift* 12 (1892): 642–44 and 1346–48.

Lumbroso, Giacomo. See items 189 and 1039.

Luschnat, Otto. See item 1066.

878 Luthmer, Johannes. *De choriambo et ionico a minore diiambi loco positis.* Argentorati: C. J. Treubner, 1884. 99 p.

Luzac, Joannes. See item 72.

879 Maas, Martha. "Back Views of the Ancient Greek Kithara." *Journal of Hellenic Studies* 95 (1975): 175 and plate XIXa.

880 ————. "On the Shape of the Ancient Greek Lyre." *Galpin Society Journal* 27 (1974): 113–17.

881 ————. "The Phorminx in Classical Greece." *Journal of the American Musical Instrument Society* 2 (1976): 34–55.

882 ————. "*Polychordia* and the Fourth-Century Greek Lyre." *Journal of Musicology* 10 (1992): 74–88.

883 ————. "Timotheus at Sparta: The Nature of the Crime." In *Musical Humanism and Its Legacy: Essays in Honor of Claude V. Palisca*, ed. Barbara R. Hanning and Nancy K. Baker, 37–52. Festschrift Series, no. 11. New York: Pendragon Press, 1992.

884 Maas, Martha, and Jane McIntosh Snyder. *Stringed Instruments of Ancient Greece.* New Haven: Yale University Press, 1989. xx,261 p.

McCallum, Mary. See item 940.

885 McClain, Ernest G. "Musical 'Marriages' in Plato's Republic." *Journal of Music Theory* 18 (1974): 242–72.

886 ————. *The Myth of Invariance: The Origin of the Gods, Mathematics and Music from the Ṛgveda to Plato.* New York: Nicolas Hays, 1976. 216 p.

887 ————. "A New Look at Plato's *Timaeus.*" *Music and Man* 1 (1975): 341–60.

888 ————. "Plato's Musical Cosmology." *Main Currents in Modern Thought* 30 (1973): 34–42.

889 ————. *The Pythagorean Plato: Prelude to the Song Itself.* Stony Brook, N.Y.: Nicolas Hays, 1978. x,192 p.

890 ————. "The Tyrant's Allegory." *Interdisciplina* 1, no. 3 (1976): 23–36.

891 McCorkle, Thomas Smith. "Music in Greek Life and Some of Its Educational Implications." M.A. thesis, Southern Methodist University, 1936. 97 p.

892 McDaniels, J. H. "Delphian Hymn to Apollo." *Nation* 58 (1894): 341–42.

893 Machabey, Armand. *De Ptolémée aux Carolingiens.* Biblioteca di "Quadrivium," serie musicologica, vol. 4. Bologna: Istituto di studi musicale e teatrali, 1964. 24 p.

894 ————. "Etudes de musicologie pré-médiéval." *Revue de musicologie* 19 (1935): 65–77, 129–47, 213–35; 20 (1936): 1–21.

895 ————. "Notes de musicologie pré-médiéval." *Revue musicale* 15 (1934): 275–82.

896 Machabey, Armand, and Jacques Chailley. "Àpropos de Thémison." *Revue de musicologie* 41 (1958): 3–26.

Mack, Dietrich. See item 577.

897 McKinnon, James. *Music in Early Christian Literature.* Cambridge Readings in the Literature of Music. Cambridge: Cambridge University Press, 1987. xi,180 p.

898 ————. "The Rejection of the Aulos in Classical Greece." In *Music and Civilization: Essays in Honor of Paul Henry Lang*, ed. Edmond Strainchamps and Maria Rika Maniates, 203–14. New York: Norton, 1984.

————. See also items 294 and 705.

899 MacLachlan, Bonnie. "The Harmony of the Spheres: *Dulcis sonus.*" In *Harmonia mundi: Musica e filosofia nell'antichità: Music and Philosophy in the Ancient World*, ed. Robert W. Wallace and

Bonnie MacLachlan, 7–19. Biblioteca di Quaderni urbinati di cultura classica, vol. 5. Roma: Edizioni dell'Ateneo, 1991.

————. See also items 17, 143, 355, 1236, 1440, 1530, and 1532–33.

900 Macran, Henry S. "Greek Music." In *Grove's Dictionary of Music and Musicians*, 3d ed. by H. C. Colles, 2:441–49. 5 vols. London: Macmillan, 1927–28.

————. See also item 81.

901 Macrobius. *Commentary on the Dream of Scipio*. Trans., with an introduction and notes by William Harris Stahl. Columbia Records of Civilization. New York: Columbia University Press, 1952. xiv,278 p.

Maehler, Herwig. See item 1082.

Mahling, Christoph-Hellmut. See item 386.

Mahne, Gulielmus Leonardus. See item 70.

Mainka, Jürgen. See item 905.

902 Majno, Guido. *The Healing Hand: Man and Wound in the Ancient World*. Cambridge: Harvard University Press, 1975. xxiii,571 p.

Малеина, А. И. See item 1101.

903 Maltezos, C. "Des gammes diatoniques." *Πρακτικὰ Ἀκαδ. Ἀθην.* (1926): 104–11.

904 ————. "Ἐπὶ τῆς θεωρίας τῆς γενέσεως τῶν διατονικῶν κλιμάκων." *Πρακτικὰ Ἀκαδ. Ἀθην.* (1926): 145–47.

Maniates, Maria Rika. See item 898.

905 Mann, Rosemarie. "Retrospektive als Vermittlung und Fortschritt." In *Wegzeichen: Studien zur Musikwissenschaft*, hrsg. Jürgen Mainka und Peter Wicke, 21–24. Berlin: Neue Musik, 1985.

906 Marcello, Benedetto. *Estro poetico-armonico, paraphrasi sopra il primi cinquanta salmi*. Poesia di Girolamo Ascanio Giustiani, musica di Benedetto Marcello. 8 vols. Venedig: [Domenico Lovisa], 1724–26; reprint, Farnborough: Da Capo Press, 1966.

On Greek music, see 1:1–9, 3:i–vi, and 4:vi–viii.

Marenghi, Gerardo. See item 62.

907 Marnold, Jean. "Les fondements naturels de la musique Grecque antique." *Sammelbände der Internationalen Musikgesellschaft* 10 (1908–9): 323–84.

908 Marpurg, Friedrich Wilhelm. *Kritische Einleitung in die Geschichte und Lehrsätze der alten und neuen Musik*. Berlin: G. A. Lange, 1759. 246 p.

Marquard, Paul. See items 75–76.

909 Marrou, Henri Irénée. "Les fragments musicaux du papyrus de Zénon, Musée du Caire N. 59532." *Revue de philologie* 13 (1939): 308–20.

910 ————. *Histoire de l'éducation dans l'antiquité.* Paris: Éditions du Seuil, 1948. 596 p.

English edition: *A History of Education in Antiquity.* Trans. George Lamb. London: Sheed and Ward, 1956. xviii,466 p.

911 ————. "ΜΕΛΟΓΡΑΦΙΑ." *L'Antiquité classique* 15 (1946): 289–96.

912 ————. *Μουσικὸς Ἄνηρ: Études sur les scènes de la vie intellectuelle figurant sur les monuments funéraires romains.* Grenoble: Allier, 1937. 310 p.

913 ————. *St. Augustin et la fin de la culture antique.* Bibliothèque des Écoles françaises d'Athènes et de Rome, vol. 145. Paris: E. de Boccard, 1949. xv,713 p.

914 Martellotti, Guido. *Mesomede.* Pubblicazioni della Scuola di filologia classica presso la R. Università di Roma, ser. I, vol. 1, fasc. 3. Rome: Università di Roma, 1929. 47 p.

915 Martianus Capella. *Martianus Capella and the Seven Liberal Arts.* 2 vols. Trans. and comm. by William Harris Stahl, with Richard Johnson and E. L. Burge. Records of Civilization: Sources and Studies, no. 84. New York: Columbia University Press, 1971–77. xiv,274 + [viii],389 p.

916 ————. *Martianus Capella.* Edidit James Willis. Leipzig: B. G. Teubner, 1983. xxix,450 p.

————. See also item 529.

917 Martin, Émile. *Essai sur les rythmes de la chanson grecque antique.* Études et commentaires, vol. 14. Paris: Klincksieck, 1953. viii,364 p.

918 ————. *Trois documents de musique grecque.* Études et commentaires, vol. 15. Paris: Klincksieck, 1953. 78 p.

919 Martin, Thomas Henri. "Hypothèse astronomique de Pythagore." *Bullettino di bibliografia e di storia delle scienza matematiche e fisiche* 5 (1872): 99–126.

————. See also item 1499.

Martindale, Don. See item 1538.

Martinez, Marie L. See item 532.

920 Martini, Giovanni Battista. *Storia della musica.* 3 vols. Bologna: Lelio della Volpe, 1757–81. xii,508 + xxxii,375 + xx,459 p.

The bulk of vols. 2–3 is devoted to Greek music.

————. See also item 1201.

921 Marx, Friedrich. "Critica et hermeneutica." *Rheinisches Museum* 83 (1934): 376–79.

922 ————. "De Sicili cantilena." *Rheinisches Museum* 61 (1906): 145–48.

923 ————. "Musik aus der griechischen Tragödie." *Rheinisches Museum* 82 (1933): 230–46.

924 Marzi, Giovanni. "Il «Decreto» degli Spartani contro Timoteo (Boeth., «De instit. mus.» 1,1)." In *La musica in Grecia,* ed. Bruno Gentili and

Roberto Pretagostini, 264–72. Storia e società. Roma-Bari: Laterza, 1988.

925 ————. "Il papiro musicale dell' 'Oreste' di Euripide." In *Scritti in onore di Luigi Ronga,* 315–29. Milano: Riccardo Ricciardi, 1973.
Plates follow pp. 316, 322, and 326.

————. See also item 102.

926 Masaraki, Despina W. "Ein Aulos der Sammlung Karapanos." *Mitteilungen des deutschen archäologischen Instituts (Athen. Abt.)* 89 (1974): 105–21.

927 Masi, Michael. "Boethius and the Iconography of the Liberal Arts." *Latomus: Revue d'études latines* 33 (1974): 57–75 and plates VII–XV.

928 Mathiesen, Thomas J. *Ancient Greek Music Theory: A Catalogue raisonné of Manuscripts.* RISM BXI. Munich: G. Henle Verlag, 1988. xc,828 p.

929 ————. "Aristides Quintilianus and the *Harmonics* of Manuel Bryennius: A Study in Byzantine Music Theory." *Journal of Music Theory* 27 (1983): 31–47.

930 ————. "Ars Critica and Fata Libellorum: The Significance of Codicology to Text Critical Theory." In *Music Theory and Its Sources: Antiquity and the Middle Ages,* ed. André Barbera, 19–37. Notre Dame, Ind.: Notre Dame University Press, 1990.

931 ————. "Giorgio Valla" and "Dufay and Harmonia." In *International Musicological Society: Report of the Twelfth Congress, Berkeley 1977,* ed. Daniel Heartz and Bonnie Wade, 879–80 and 890–91. Kassel: Bärenreiter, 1981.

932 ————. "Harmonia and Ethos in Ancient Greek Music." *Journal of Musicology* 3 (1984): 264–79.

933 ————. "Hermes or Clio? The Transmission of Ancient Greek Music Theory." In *Musical Humanism and Its Legacy: Essays in Honor of Claude V. Palisca,* ed. Barbara R. Hanning and Nancy K. Baker, 3–35. Festschrift Series, no. 11. New York: Pendragon Press, 1992.

934 ————. "Music, Aesthetics, and Cosmology in Early Neo-Platonism." In *Paradigms in Medieval Thought,* ed. Nancy van Deusen and Alvin E. Ford, 37–64. Lewiston, N.Y.: Edwin Mellen Press, 1990.

935 ————. "New Fragments of Ancient Greek Music." *Acta musicologica* 53 (1981): 14–32.

936 ————. "Problems of Terminology in Ancient Greek Theory: ʽAPMONIA." In *Festival Essays for Pauline Alderman,* ed. Burton Karson, 3–17. Provo, Utah: Brigham Young University Press, 1976.

937 ————. "Rhythm and Meter in Ancient Greek Music." *Music Theory Spectrum* 7 (1985): 159–80.

938 ————. "Towards a Corpus of Ancient Greek Music Theory: A New *Catalogue raisonné* Planned for RISM." *Fontes artis musicae* 25, no. 2 (1978): 119–34.

939 ————, ed. and trans. *Strunk's Source Readings in Music History.* Vol. 1, *Greek Views of Music.* New York: Norton, 1998. xii,115 p.

————. See also items 50, 334, 475, and 524.

Mau, Jürgen. See item 1354.

940 Mavroulides, Panos J. *The Ancient Musical Culture, Literature, and Drama of the Greeks.* Trans. Mary McCallum. Athens: By the author, n.d. 95 p.

941 Mayne, Mabel Delillian. "Parallel Study of Ancient and Classical Greek Dance and Music." M.A. thesis, George Peabody College for Teachers, 1938. 124 p.

942 Mei, Girolamo. *De modis.* Ed. Eisuke Tsugami. Tokyo: Keiso Shobo, 1991. lvi,247 p.

————. See also items 1031 and 1200.

943 Meibom, Marcus. *Antiquae musicae auctores septem.* Graece et Latine. Marcus Meibomius restituit ac notis explicavit. Amstelodami, apud Ludovicum Elzevirium, 1652; reprint in Monuments of Music and Music Literature in Facsimile, II/51, New York, Broude Brothers, 1977.

Each of the first six theorists in the volume has a separate pagination. Aristides Quintilianus begins a "second volume," which is consecutively paginated.

————. See also items 22, 24, 45, 67–68, 107, 470, 521, 949, 1009–10, and 1258.

Meinar, Edwin L., Jr. See item 1102.

944 Meinecke, Bruno. "Music and Medicine in Classical Antiquity." In *Music and Medicine*, ed. Dorothy M. Schullian and Max Schoen, 47–95. New York: H. Schuman, 1948.

Meineke, A. See item 1400.

Meiser, Karl. See item 214.

Mendel, Arthur. See item 563.

Menge, Heinrich. See items 331 and 474.

Mengelberg, Willem. See items 819 and 1363.

945 Meriani, Angelo. "Un 'esperimento' di Pitagora (Nicom. *Harm. ench.* 6, pp. 245–248 Jan)." In *Mousike: Metrica, ritmica e musica greca in memoria di Giovanni Comotti*, ed. Bruno Gentili and Franca Perusino, 77–92. Pisa: Istituti editoriali e poligrafici internazionali, 1995.

946 ————. "POxy 667: Manuale di teoria musicale." In *Aristoxenica, Menandrea, fragmenta philosophica*, ed. Francesco Adorna, 31–45. Studi e testi per il corpus dei papiri filosofici greci e latini, iii; Accademia toscana di scienze e lettere «La Colombaria», Studi, xci. Florence: Olschki, 1988.

947 Mersenne, Marin. *Traité de l'harmonie universelle, où est contenu la musique theorique et pratique des anciens et modernes, avec les*

causes de ses effets. Enrichie de raisons prises de la philosophie, et de mathematiques. Paris: Guillaume Baudry, 1627. [32],477 p.

————. See also items 104, 106, and 468.

Mesomedes. See items 192, 642, 677, 699, 719, 914, 1179, and 1485.

948 Meurs, Guilielmus Ludovicus van. *De arte musica apud Graecos.* Hagae Comitum: Nijhoff, 1879. 64 p.

949 Meurs, Johannes van. *Aristoxenus. Nicomachus. Alypius. Auctores musices antiquissimi, hactenus non editi.* Joannes Meursius nunc primus vulgavit, et notas addidit. Lugduni Batavorum, ex officinâ Ludovici Elzeviri. Typis Godefridi Basson, 1616. 196 p.

Reprinted with Meibom's Latin translation in Meurs's *Operum VI,* pp. 335–528. Florentiae, sacrae caesareae maiestatis typis, 1745.

————. See also items 22, 67, and 1009.

950 Meyer, P. Bonaventura. *῾ΑΡΜΟΝΙΑ. Bedeutungsgeschichte des Wortes von Homer bis Aristoteles.* Zürich: Gebrüder Leemann, 1932. 81 p.

=Ph.D. dissertation, Freiburg-Schweiz.

951 Meyer, Wilhelm. "Zur Geschichte des griechischen und des lateinischen Hexameters." *Sitzungsberichte der philos-philologischen und historischen Classe der Königliche Bayerischen Akademie der Wissenschaften zu München* (1884): 979–1089.

952 Meyer-Baer, Kathi. "Griechische Musik. Ihre Rolle im griechischen Geistesleben und ihre Bedeutung für die abendländische Kunst." *Sinica* 2 (1927): 207–17.

953 ————. *Music of the Spheres and the Dance of Death.* Princeton, N.J.: Princeton University Press, 1970. xxvii,376 p.

954 Michaelides, Solon. *The Music of Ancient Greece: An Encyclopaedia.* London: Faber and Faber, 1978. xvi,365 p.

955 Michaelis, C. F. "Aristoteles über Musik." *Allgemeine musikalische Zeitung* 16 (1814): 109–16.

Migne, J. P. See item 101.

956 Mingarelli, Giovanni Luigi. *De Pindari odis conjecturae.* Bonn: L. a. Vulpe, 1772. 72 p.

Mitchell, T. C. See item 1242.

957 Mitsos, Marcellus. "ΙΕΡΟΣ ΥΜΝΟΣ ΕΞ ΑΣΚΛΗΠΙΕΙΟΥ ΕΠΙΔΑΥΡΟΥ." *Αρχαιολογικὴ ἐφημερίς* (1980): 212–16.

958 Moberg, C. A. "Sfärernas harmoni." *Svensk tidskrift för musikforskning* 19 (1937): 113–64.

959 Moens, Petronella. "De delphische hymnen en de Griekse muziek." *Hermeneus* 24 (1953): 113–15 and 122–26.

960 ————. *De twee delphische hymnen met muzieknoten.* Purmerend: J. Muusses, 1930. viii,125 p.

=Ph.D. dissertation, Utrecht.

961 Moffatt, Ruth Jennings. "The Dance in the Life of the Early Greeks." M.A. thesis, George Peabody College for Teachers, 1932. 87 p.

962 Möhler, Anton. *Geschichte der alten und mittelalterlichen Musik.* 2d ed. Sammlung Göschen, vol. 121. Leipzig: Göschen, 1907. 136 p.

963 ————. *Die griechische, griechisch-römische und altchristlich-lateinische Musik. Ein Beitrag zur Geschichte des gregorianischen Chorals.* Rom: Gesellschaft des Göttlichen Heilandes, 1898. xxiii,88 p.

964 Monro, David Binning. *The Modes of Ancient Greek Music.* Oxford: Clarendon, 1894. xvi,145 p.

965 ————. "On Aristotle, *Prob.* 19.12." *Journal of Philology* 1 (1868): 81–97.

————. See also item 658.

966 Montagu, Jeremy. "Did Shawms Exist in Antiquity?" In *The Archaeology of Early Music Cultures. Third International Meeting of the ICTM Study Group on Music Archaeology,* ed. Ellen Hickmann and David W. Hughes, 47–50. Orpheus: Schriftenreihe zu Grundfragen der Musik, vol. 51. Bonn-Bad Godesberg: Verlag für systematische Musikwissenschaft, 1988.

967 Montargis, Frédéric. *De Platone musico.* Paris: G. Chamerot, 1886; reprint, Utrecht: Joachimsthal, 1976. 62 p.
=Ph.D. dissertation, Paris, 1881.

968 Moraux, Paul. "La 'mimesis' dans les théories anciennes de la danse, de la musique, et de la poésie." *Études classiques* 23 (1955): 3–13.

Morelli, Federico. See item 105.

969 Morelli, Jacopo. *Aristidis oratio adversus Leptinem, Libonii declamatio pro Socrate, Aristoxenii rhythmicorum elementorum fragmenta ex bibliotheca Veneta d. Marci.* Venetiis, typis Caroli Palevii, 1785. xliii,305 p.

————. See also item 69 and 74.

970 Mosche, K. *Die Musik des griechischen Alterthumes, als Vorbild für die Musik unserer Zeit: Ein Beitrag zur Würdigung unseres musikalischen Standpunctes.* Lübeck: Gebrüder Borchers, 1848. 12 p.

971 Moseley, W. Willis. *The Quantity and Music of the Greek Chorus Discovered.* Oxford: J. H. Parker, 1847. 40 p.

Moser, Dietz-Rüdiger. See item 1266.

972 Moser, Hans Joachim. *Die Epochen der Musikgeschichte im Überblick.* Stuttgart: J. G. Cotta, 1930. vii,193 p.

973 Mountford, James Frederick. "Greek Music and Its Relation to Modern Times." *Journal of Hellenic Studies* 40 (1920): 13–42.

974 ————. "Greek Music in the Papyri and Inscriptions." In *New Chapters in Greek Literature, Second Series,* ed. John U. Powell and E. A. Barber, 146–83. Oxford: Clarendon, 1929.

975 ————. "The Harmonics of Ptolemy and the Lacuna in II, 14." *Transactions of the American Philological Association* 57 (1926): 71–95.

976 ————. "The Music of Pindar's 'Golden Lyre.'" *Classical Philology* 31 (1936): 120–36.

977 ————. "The Musical Scales of Plato's *Republic*." *Classical Quarterly* 17 (1923): 125–36.

978 ————. "A New Fragment of Greek Music in Cairo." *Journal of Hellenic Studies* 51 (1931): 91–100.

979 Mountford, J. F., and R. P. Winnington-Ingram. "Music." In *The Oxford Classical Dictionary*, 2d ed., ed. N. G. L. Hammond and H. H. Scullard, 705–13. Oxford: Clarendon, 1970.

980 Moutsopoulos, Evanghélos. "Dialectique musicale et dialectique philosophique chez Platon." *Annales de la Faculté des Lettres et Sciences humaines d'Aix* 37 (1963): 159–63.

981 ————. "Euripide et la philosophie de la musique." *Revue des études grecques* 75 (1962): 396–452.

982 ————. "Μουσικὴ κίνησις καὶ ψυχολογία ἐν τοῖς ἐσχάτοις Πλατωνικοῖς διαλόγοις." *Athena* 64 (1960): 194–208.

983 ————. *La musique dans l'oeuvre de Platon*. Paris: Presses Universitaires, 1959. 428 p.

984 ————. "Une philosophie de la musique chez Eschyle." *Revue des études grecques* 72 (1959): 18–56.

985 ————. *La philosophie de la musique dans la dramaturgie antique. Formation et structure*. Athens: Hermès, 1975. 184 p.

986 ————. "La philosophie de la musique et le théâtre d'Aristophane." In *Χάρις: Κωνσταντίνω Ἰ. Βουρβέρη· ἀφιέρωμα τῶν μαθητῶν τοῦ ἐπὶ τῇ ἑξηκονταπενταετηρίδι τοῦ βίου αὐτοῦ*, 201–37. Ἀθῆναι: Ἀδελφοὶ Μυρτίδη, 1964.

987 ————. "Τὸ πρόβλημα τοῦ φανταστικοῦ παρὰ Πλωτίνῳ." *Ἐπιστημονικὴ Ἐπετηρὶς τῆς Φιλοσοφικῆς Σχολῆς τοῦ Πανεπιστημίου Ἀθηνῶν* 19 (1968–69): 94–174.

988 ————. "Science harmonique et empirisme musical chez Platon." In *Actes du XXII^{e} Congrès international d'histoire des sciences*, 3A:109–12. Paris: Albert Blanchard, 1971.

989 ————. "Sophocle et la philosophie de la musique." *Annales de la Faculté des Lettres et Sciences humaines d'Aix* 33 (1959): 107–38.

990 ————. "Sur la 'participation' musicale chez Plotin." *Philosophia* 1 (1971): 379–89.

991 Moyer, Ann E. *Musica scientia: Musical Scholarship in the Italian Renaissance*. Ithaca, N.Y.: Cornell University Press, 1992. vii,325 p.

992 Müller, Gerhard. *Studien zu den platonischen Nomoi*. Zetemata, vol. 3. München: Beck, 1951. 194 p.

Müller, Iwan von III. See item 555.

993 Müller, Lucian. *Metrik der Griechen und Römer. Für die obersten Klassen der Gymnasien und angehende Studenten der Philologie bearbeitet. Mit einem Anhang: Entwicklungsgang der antiken Metrik.* Leipzig: B. G. Teubner, 1880, 1885. xii,86 p.

Italian editions, Milano: U. Hoepli, 1883, 1897; Dutch edition, Groningen: Nordhoff en Smit, 1881; and French edition, Paris: Klincksieck, 1882.

994 ————. "Über die Betonung der hinkenden Jamben und Trochäen." *Berliner philologische Wochenschrift* 12 (1892): 995–96.

Müller, Reinmar. See item 1219.

995 Müller, Ulrich. "Zur musikalischen Terminologie der antiken Rhetorik. Ausdrücke für Stimmanlage und Stimmgebrauch bei Quintilian, *Institutio oratoria* 11,3." *Archiv für Musikwissenschaft* 26 (1969): 29–48 and 105–24.

996 Müller-Blattau, Josef. *Das Verhältnis von Wort und Ton in der Geschichte der Musik.* Stuttgart: Mitzler, 1952. 43 p.

997 Müller-Graupa, Edwin. "Clavicymbalum." *Antike* 7 (1930): 38–40.

998 Münscher, Karl. "Zum christlichen Dreifaltigkeitshymnus aus Oxyrhynchos." *Philologus* 80 (1925): 209–13.

999 Muller, Henricus Clemens. *De rhythmis graecorum capita quaedam.* Amstelodami, Müller, 1880. 118 p.

1000 Munro, Kathleen. "The Role of Music in the Development of Educational Thought among the Early Classical Greeks." Ph.D. dissertation, University of Washington, 1937. ii,189 p.

Munson, Rosaria. See item 351.

Murr, Christoph Theophilus de. See items 1061–62.

Murray, Oswyn. See item 210.

1001 Muth, R. "Hymenaios und Epithalamion." *Wiener Studien* 67 (1954): 5–45.

Mynors, R. A. B. See item 293.

1002 Najock, Dietmar. *Anonyma de musica scripta Bellermanniana.* Leipzig : B. G. Teubner, 1975. xxvi,38 p.

See also items 191 and 1003.

1003 ————. *Drei anonyme griechische Traktate über die Musik. Eine kommentierte Neuausgabe des Bellermannschen Anonymus.* Göttinger musikwissenschaftliche Arbeiten, vol. 2. Kassel: Bärenreiter, 1972. 229 p.

See also items 191 and 1002.

1004 Nakayama, Teiichirō. "Girisha-ongaku no senritsu-hō to wasei." *Memoirs of Kunitachi Musical College* 4 (1968): 55–70.

Navarre, Octave. See item 1254.

1005 Nelson, Jane Gray. "'Xylophones' on Gnathia Vases." *BABESCH: Bulletin antike Beschaving* 61 (1986): 30–33.

1006 Nelson, J. R. "Available Greek and Roman Music." *Classical Journal* 4 (1908): 34–35.

1007 Neubecker, Annemarie Jeanette. *Altgriechische Musik: Eine Einführung.* Die Altertumswissenschaft. Darmstadt: Wissenschaftliche Buchgesellschaft, 1977. 183 p.

1008 ————. *Die Bewertung der Musik bei Stoikern und Epikureern. Eine Analyse von Philodems Schrift De musica.* Deutsche Akademie der Wissenschaften zu Berlin. Institut für griechisch-römische Altertumskunde. Arbeitsgruppe für hellenistisch-römische Philosophie, vol. 5. Berlin: Akademie-Verlag, 1956. 103 p.

————. See also item 567.

Neuwirth, Gertrude. See item 1538.

1009 Nicomachus. "Νιχομάχου Γερασηνοῦ Πυθαγορικοῦ 'Αρμονικῆς ἐγχειρίδιον, βιβλία δύο." In *Aristoxenus. Nicomachus. Alypius. Auctores musices antiquissimi, hactenus non editi,* Ioannes Meursius nunc primus vulgavit, et notas addidit, 61–92. Lugduni Batavorum, ex officinâ Ludovici Elzeviri, typis Godefridi Basson, 1616.

Reprinted with a Latin translation by Marcus Meibom in Ioannes Meursius, *Operum VI* (Florentiae, sacrae caesareae maiestatis typis, 1745), 423–72.

1010 ————. "Nicomachi Geraseni Pythagorici harmonices manuale. Marc. Meibomius primus vertit, ac notis explicavit." In *Antiquae musicae auctores septem,* Marc. Meibomius restituit ac notis explicavit. Amstelodami, apud Ludovicum Elzevirium, 1652; reprint in Monuments of Music and Music Literature in Facsimile, II/51, New York, Broude Brothers, 1977. 60 p.

Each of the first six treatises in the volume is separately paginated.

1011 ————. *Nicomaque de Gérase. Manuel d'harmonique et autres textes relatifs à la musique traduits en français pour la première fois.* Avec commentaire perpétuel par Charles-Emile Ruelle. Collection des auteurs grecs relatifs à la musique, no. 2. Paris: Baur, 1881. 55 p.

=Annuaire de l'Association pour l'encouragement des études grecques en France 14 (1880): 162–216.

1012 ————. "Nicomachus Gerasenus." In *Musici scriptores graeci,* recog. Carolus Janus, 209–82. Leipzig: B. G. Teubner, 1895; reprint, Hildesheim: G. Olms, 1962.

1013 ————. Levin, Flora Rose. "Nicomachus. Manual of Harmonics. Translation and Commentary." Ph.D. dissertation, Columbia University, 1967. 2,xi,275 p.

UM 67-12,266. *DA* 28 (1967–68): 1415-A.

1014 ————. "The *Enchiridion.*" In *Greek Musical Writings,* 2 vols., ed. Andrew Barker, 2:247–69. Cambridge Readings in the Literature of Music. Cambridge: Cambridge University Press, 1984–89.

1015 ———. "Manuale di armonica." In *La manualistica musicale greca,* ed. and trans. Luisa Zanoncelli, 133–243. Milan: Angelo Guerini, 1990.

The text follows Jan (item 723).

1016 ———. *The Manual of Harmonics.* Trans. and comm. Flora R. Levin. Grand Rapids, MI: Phanes, 1994. 208 p.

———. See also items 237, 303, 309, 771, 849, and 945.

1017 Niecks, Frederick. "The Ethical Aspects of Music." *Music* 21 (1901–2): 108–17, 193–200; 20 (1902): 1–16.

1018 Nietzsche, Friedrich. *Nachgelassene Schriften 1870–73.* Nietzsche Werke, III/2. Berlin: W. de Gruyter, 1973. vi,394 p.

Contains a variety of Nietzsche's writings on Greek music and thought.

1019 Nolan, Frederick. "On the Theoretical Music of the Greeks." *Transactions of the Royal Society of Literature of the United Kingdom, London* 2, no. 2 (1834): 155–204.

1020 Norlind, Tobias. "Lyra und Kithara in der Antike." *Svensk tidskrift för musikforskning* 16 (1934): 77–98.

Norwood, Gilbert. See item 15.

1021 Ôki, Hiroyasu. *La musique grecque.* Yokohama: By the author, 1979. 124 p.

1022 ———. *Répertoire de littérature musicale de la Grèce antique: 1958–1978.* Yokohama: By the author, 1981. 30 p.

Olleson, Edward. See item 1029.

1023 Olsen, Poul Rovsing. "An Aulos in the Danish National Museum." *Dansk Aarbog for Musikforskning 1966–67* (1968): 3–9.

Ormerod, H. A. See item 1044.

Osthoff, H. See item 678 and 826.

1024 Ostrogorsky, George. *History of the Byzantine State.* Rev. ed., trans. Joan Hussey. New Brunswick, N.J.: Rutgers University Press, 1969. xl,624 p.

1025 Otto, Walter Friedrich. *Die Musen und der göttliche Ursprung des Singens und Sagens.* Düsseldorf: E. Diederich, 1955. 88 p.

1026 Ouy, Gilbert. "Problèmes d'édition des manuscrits autographes médiévaux." In *Les Problèmes posés par l'édition critique des textes anciens et médiévaux,* ed. Jacqueline Hamesse, 399–419. Publications de L'Institut d'études médiévales, Textes, études, congrès, vol. 13. Louvain-la-Neuve: Université Catholique de Louvain, 1992.

Pachymeres, George. See item 1417.

1027 Page, Denys Lionel. *Alcman: The Partheneion.* Oxford: Clarendon, 1951. xi,178 p.

1028 Palisca, Claude V. *The Florentine Camerata: Documentary Studies and Translations.* Music Theory Translation Series. New Haven, Conn.: Yale University Press, 1989. vi,234 p.

The volume includes a translation of Carlo Valgulio's Proem to Plutarch's *De musica.*

1029 ———. "G. B. Doni, Musicological Activist, and His 'Lyra Barberina.'" In *Modern Musical Scholarship,* ed. Edward Olleson, 180–205. Stocksfield: Oriel Press, 1980.

1030 ———. *G. B. Doni's* Lyra Barberina: *Commentary and Iconographical Study; Facsimile Edition with Critical Notes.* Miscellanee saggi convegni, vol. 18. Bologna: Antiquae musicae italicae studiosi, 1981. viii,194 + 32 photographic pages and 5 foldouts.

1031 ———. *Girolamo Mei, Letters on Ancient and Modern Music to Vincenzo Galilei and Giovanni Bardi: A Study with Annotated Texts.* Rev. ed. Musicological Studies and Documents, no. 3. Neuhausen-Stuttgart: American Institute of Musicology/Hänssler, 1977. 212 p.

1032 ———. *Humanism in Italian Renaissance Musical Thought.* New Haven, Conn.: Yale University Press, 1985. xiii,471 p.

An extended study of musical humanists and their scholarship on ancient Greek music and music theory.

1033 ———. "Introductory Notes on the Historiography of the Greek Modes." *Journal of Musicology* 3 (1984): 221–28.

1034 ———. *Studies in the History of Italian Music and Music Theory.* Oxford: Clarendon, 1994. xii,522 p.

———. See also item 217.

1035 Papastomatopulos, Joh. *Studien zur alten griechischen Musik.* Bonn: Lempertz, 1878. 63 p.

=Ph.D. dissertation, Jena.

1036 Papazoglou, Triantaph Eleuth. *Ἱστορία τῆς ἑλληνικῆς μουσικῆς (ἀπὸ τὸν Ὀρφέα μέχρι σήμερα): ἀρχαία ἑλληνικὴ μουσική, βυζαντινὴ μουσική, τὸ δημοτικὸ τραγούδι, ἐκσυγχρονισμὸς* . . . . [N.p., 1976?]. 120 p.

1037 Pappalardo, V. "Vicende della notazione musicale nei testi drammatici greci." *Memorie dell' Istituto Lombardo* 35 (1975): 355–413.

1038 Paratore, Ettore. *Musica e poesia nell' antica Roma.* Instituta et monumenta, II/10. Cremona: Fondazione Claudio Monteverdi, 1981. 26 p.

1039 Paribeni, R. "Cantores graeci nell' ultimo secolo della repubblica in Roma." *Aegyptus, serie scientifica* 3 (1925): 287–92.

"Mélanges Lumbroso, Raccolta di scritti in onore di G. Lumbroso."

1040 Parodi, Lor. *La musica greca.* Geneva: Ciminago, 1894. 19 p.

1041 Pasini, Francesco. "À propos d'une contradiction de Diodore de Sicile." In *Riemann-Festschrift. Gesammelte Studien. Hugo Riemann zum sechzigsten Geburtstag überreicht von Freunden und Schülern,* 185–89. Leipzig: M. Hesse, 1909.

Pass, Walter. See item 688.

1042 Paul, Oscar. *Die absolute Harmonik der Griechen*. Leipzig: Dörffel, 1867. ix,74 p. + 5 tables.

————. See also items 216 and 1149.

1043 Pausanias. *Pausaniae Graeciae descriptio*. 3 vols. Rec. F. Spiro. Leipzig: B. G. Teubner, 1903. xxi,420 + 389 + 357 p.

1044 ————. *Description of Greece*. 5 vols. Trans. W. H. S. Jones and H. A. Ormerod. Vol. 5 arr. R. E. Wycherley. Loeb Classical Library. Cambridge: Harvard University Press, 1918–35. xxix,457 + vii,551 + v,441 + v,605 + xviii,272 p.

1045 Pearl, Orsamus. "Rules for Musical Contests." *Illinois Classical Studies* 3 (1978): 132–38 and plate.

See also item 789.

1046 Pearl, Orsamus, and Reginald P. Winnington-Ingram. "A Michigan Papyrus with Musical Notation." *Journal of Egyptian Archaeology* 51 (1965): 179–95.

1047 Pearson, Lionel. "The Dynamics of Pindar's Music: Ninth Nemean and Third Olympian." *Illinois Classical Studies* 2 (1977): 54–69.

————. See also items 91 and 1102.

Pečírka, J. See item 257.

Pečman, Rudolf. See item 1218.

Pena, Ioannes. See items 463, 466, and 469.

Peppmüller, Rudolf. See items 196–97.

1048 Perls, Hugo. "Μοῦσα: Étude sur l'esthétique de Platon." *Revue philosophique* 117 (1934): 259–84 and 441–71.

1049 Perne, F. L. "Recherches sur la musique antique." *Revue musicale* 3 (1828): 433–41 and 481–91; 4 (1829): 25–34 and 219–28.

1050 Perrett, Wilfrid. "The Heritage of Greece in Music." *Proceedings of the Musical Association* 58 (1931–32): 85–98.

A "discussion" follows (pp. 98–103), involving such figures as Kathleen Schlesinger and A. H. Fox Strangways.

1051 ————. "The Orestes Fragment." *The Musical Standard* n. s. 35 (1930): 23 and 39.

1052 ————. *Some Questions of Musical Theory*. Cambridge: Heffer and Sons, 1926–28. 97 p.

Chapter I: How Olympos Found His New Scale; chapter II: The Olympion; chapter III: The Second String; chapter IV: Ptolemy's Tetrachords.

1053 Perrot, Jean. *The Organ from Its Invention in the Hellenistic Period to the End of the Thirteenth Century*. Trans. Norma Deane. London: Oxford University Press, 1971. xxv,317 p.

Perusino, Franca. See items 136, 258, 529–30, 568, 945, 1113, 1203, 1475, and 1531.

1054 Pfrogner, Hermann. *Die Zwölfordnung der Töne*. Wien: Amalthea, 1953. 280 p.

Pherecrates. See items 227, 1069, 1197, 1199, and 1410.

1055 Philippson, Robert. "Philodemos." *Real-Enzyklopädie der klassischen Altertumswissenschaft* 19/2 (1938): 2457–60.

Philips, John. See item 1098.

1056 Phillips, Nancy. "Classical and Late Latin Sources for Ninth-Century Treatises on Music." In *Music Theory and Its Sources: Antiquity and the Middle Ages,* ed. André Barbera, 100–135. Notre Dame, Ind.: University of Notre Dame Press, 1990.

1057 Phillips, R. C. "Mean Tones, Equal-Tempered Tones, and the Harmonic Tetrachords of Claudius Ptolemy." *Memoirs and Proceedings of the Manchester Literary and Philosophical Society* 48/13 (1904): 1–8.

1058 Philo Byzantius. *Philonis Mechanicae syntaxis libri quartus et quintus.* Rec. Richardus Schöne. Berlin: Reimer, 1893. xii,96 p.

1059 Philodemus. *ΦΙΛΟΔΗΜΟΥ ΠΕΡΙ ΜΟΥΣΙΚΗΣ Δ.* Volumina herculanens, vol. 1. Neapoli, ex regia typographia, 1793. 23 p.

1060 ———. Schütz, C. G. *Proposita in Philodemi περὶ μουσικῆς librum IV. nuper ab Academicis Herculanensibus editum animaadversionum particula I.* Jena: Goerferditi 1795.

1061 ———. *Philodemi liber IV. de musica.* Graece e voluminibus Herculanensibus cum versione latina et scholiis edidit Chph. Thph. de Murr. De papyris seu voluminibus graecis Herculanensibus commentatio, accedit Nicolai Ignarre explicatio Lamellae aeneae exsecrationis repertae prope Petiliam. Argentorati, typis F. G. Levrault, 1804. ii,59 p.

1062 ———. *Philodem von der Musik. Ein Auszug aus dessen viertem Buche.* Aus dem griechischen einer Herkulanischen Papyrusrolle übersetzt von Chph. Gli von Murr. Nebst einer Probe des Hymnenstyls altgriechischer Musik. Mit zwei Kupfertafeln. Berlin: Frölich, 1806. 64 p.

1063 ———. *Philodemi de musica librorum quae exstant.* Edidit Ioannes Kemke. Leipzig: B. G. Teubner, 1884. xv,112 p.

1064 ———. Krevelen, Dirk Andree van. "De Muziek, met vertaling en commentar." Ph.D. dissertation, Amsterdam, 1939. xxv,233 p.

1065 ———. *Philodemus on Methods of Inference.* Edited with translation and commentary by Phillip H. De Lacy and Estelle A. De Lacy. Philological monographs, vol. 10. Philadelphia: American Philological Association, 1941. ix,200 p.

1066 ———. Luschnat, Otto. *Zum Text von Philodems Schrift De musica.* Deutsche Akademie der Wissenschaften zu Berlin. Institut für hellenistisch-römische Philosophie, vol. 1. Berlin: Akademie-Verlag, 1953. 36 p. + 9 tables.

———. See also items 150, 408, 566, 673, 1008, 1055, 1090, 1236, 1406, and 1578.

Philolaus. See items 273 and 1413.

1067 Photius. *Photii Bibliotheca.* 2 vols. Rec. Immanuel Bekker. Berlin: Reimer, 1824–25. 581 p.

1068 ———. *Bibliothèque.* 8 vols. Ed. and trans. René Henry. Paris: Société d'Édition «Les Belles Lettres,» 1959–77. lii,200 + 225 + 246 + 182 + 230 + 219 + 234 + 232 p.

1069 Pianko, G. "Un comico contributo alla storia della musica greca, Chirone di Ferecrate." *Eos* 53 (1963): 56–63.

1070 ———. "La musica nelle commedie di Aristofane." *Eos* 47 (1954): 23–34.

1071 Pickard-Cambridge, Arthur Wallace. *Dithyramb, Tragedy and Comedy.* 2d ed., rev. T. B. L. Webster. Oxford: Clarendon, 1962. xii,334 p.

1072 ———. *The Dramatic Festivals of Athens.* 2d ed., rev. John Gould and D. M. Lewis. Oxford: Clarendon, 1968. xxiv,358 p.

1073 ———. *The Theatre of Dionysus in Athens.* Oxford: Clarendon, 1946. xv,288 p.

1074 Pickel, Carolus. "De versuum dochmiacorum origine." *Dissertationes philologicae argentoratenses* 3 (1880): 139–212.
=Ph.D., Strassburg, 1880.

1075 Picken, Laurence. "The Music of Far Eastern Asia." In *Ancient and Oriental Music,* ed. Egon Wellesz, 83–194. New Oxford History of Music, vol. 1. London: Oxford University Press, 1957.

1076 Pierson, Lolita B. "Greek Music in Its Social Aspects." M.A. thesis, University of Oregon, 1943. 202 p.

1077 Pietzsch, Gerhard. *Die Musik im Erziehungs- und Bildungsideal des ausgehenden Altertums und frühen Mittelalters.* Studien zur Geschichte der Musiktheorie im Mittelalter, vol. 2. Halle: Niemeyer, 1932; reprint, Darmstadt: Wissenschaftliche Buchgesellschaft, 1969. 142 p.

1078 Pighi, Giovanni. "Ricerche sulla notazione ritmica greca." *Aegyptus* 21 (1941): 189–220; 23 (1943): 169–243; 39 (1959): 280–89.

———. See also item 85.

1079 Pike, Kenneth Lee. *Tone Languages.* Ann Arbor: University of Michigan Press, 1948. xii,187 p.

1080 Pindar. *Πινδάρου τὰ σωζόμενα. Pindari quae supersunt.* Textum in genuina metra restituit et ex fide librorum manuscriptorum doctorumque coniecturis recensuit, annotationem criticam scholia integra interpretationem latinam commentarium perpetuum et indices adiecit Augustus Boeckhius. 3 vols. Lipsiae, apud Ioann. August. Gottlob Weigel, 1811–21. xl,582 + lii,556 + 862 p.

1081 ———. *The Odes of Pindar, including the Principal Fragments.* Rev. ed. by Sir J. E. Sandys. Loeb Classical Library. Cambridge: Harvard University Press, 1937. xlv,635 p.

1082 ———. *Pindari carmina cum fragmentis.* Ed. Bruno Snell and Herwig Maehler. Part I, 5th ed. Part II, 1st ed. Leipzig: B. G. Teubner, 1971–89. xi,191 + viii,224 p.

————. See also items 17, 275, 388, 562, 571, 704, 811, 956, 976, 1047, 1247–48, and 1527.

1083 Pintacuda, Mario. *Interpretazioni musicali sul teatro di Aristofane.* Letteratura classica, vol. 9. Palermo: Palumbo, 1982. 139 p.

1084 ————. *La musica nella tragedia greca.* Cefalù: L. Misuraca, 1978. 233 p.

1085 Pizzani, Ubaldo. "Studi sulle fonti del 'De Institutione Musica' di Boezio." *Sacris erudiri* 16 (1965): 5–164.

1086 Pizzetti, Ildebrando. *La musica dei Greci, studio storico-critico.* Roma: Casa editrice "Musica," 1914. iii,15 p.

1087 Pizzi, Italo. *Ricordi verdiani inediti.* Turin: Roux e Viarengo, 1901. viii,128 p.

1088 Plato. *Platonis opera.* 5 vols. Ed. J. Burnet. Oxford: Clarendon Press, 1900–1907. [unpaginated]

1089 ————. *Plato in Twelve Volumes.* 12 vols. Trans. H. N. Fowler, W. R. M. Lamb, Paul Shorey, and R. G. Bury. Loeb Classical Library. Cambridge: Harvard University Press, 1914–35. xxvi,583 + xxii,508 + xxii,536 + viii, 480 + lvi,535 + lxxiii,539 + x,463 + xx,450 + v,636, xx,501 + viii,582 + xxii,490 p.

————. See also items 18, 35, 127, 142, 194, 232, 235, 242, 244, 273, 286, 363, 394, 507, 550, 567–68, 594, 660, 702–3, 730, 782, 788, 823, 839, 885–90, 967, 977, 980, 982–83, 988, 1048, 1141, 1163, 1216, 1225, 1239, 1299, 1308, 1342, 1445, 1460, 1490, 1499, 1535, and 1569.

1090 Plebe, Armando. *Filodemo e la musica.* Studi di estetica, vol. 6. Torino: Edizioni di Filosofia, [1957]. 22 p.

1091 Plutarch. *Charoli Valgulii Prooemium in musicam Plutarchi ad Titum Pyrrhinum.* Impressum Brixiae per Angelum Britannicum, Anno, 1507.

Carlo Valgulio's Proem precedes the translation on ff. a2r–b2v. The translation appears on ff. b3r–d5v.

1092 ————. "Musica." In *Plutarchi Caeronei, philosophi, historicique clarissimi opuscula (quae quidem extant) omnia,* ff. 25v–32v. Basilea, in officinâ And. Cratandri, Mense Septembri, An. 1530.

Carlo Valgulio's Proem to the treatise appears on ff. 244v–247v. This is a corrected edition of item 1091.

1093 ————. "De musica." In *Plutarchi Chaeronensis Moralia ... omnes de Graeca in Latinam linguam transcripti: Guilielmo Xilandro augustano interprete,* 564–75. Paris: J. Dupuis, 1570.

1094 ————. *ΠΛΟΥΤΑΡΧΟΥ ΔΙΑΛΟΓΟΣ ΠΕΡΙ ΜΟΥΣΙΚΗΣ. Dialogue de Plutarque sur la musique.* Traduits en françois, avec des remarques, par M. Burette. Paris: L'Imprimerie royale, 1735; reprint, Genève: Minkoff, 1973. 538 p. + 3 plates.

=*Mémoires de l'Académie des Inscriptions* 10 (1736): 111–310.

1095 ————. *The ΠΕΡΙ ΜΟΥΣΙΚΗΣ of Plutarch.* Trans. [by John Healey Bromby]. Chiswick: C. Whittingham, 1822. x,115 p.

1096 ————. *Plutarchi De musica.* Edidit Ricardus Volkmann. Leipzig: B. G. Teubner, 1856. xxiv,171 p.

1097 ————. Westphal, Rudolf. *Plutarch über die Musik.* Breslau: F. E. C. Leuckart, 1866. 128 p.

1098 ————. Philips, John, trans. "Concerning Music." In *Plutarch's Morals Translated from the Greek by Several Hands,* corr. and rev. by Wm. W. Goodwin, 1:102–35. 5 vols. Boston: Little, Brown, and Co., 1870.

1099 ————. *Plutarque de la musique, Περὶ μουσικῆς.* Édition critique et explicative par Henri Weil et Th. Reinach. Paris: Leroux, 1900. lxii,179 p.

1100 ————. Skjerne, Godtfred. *Plutarks Dialog om Musiken.* Kopenhagen: W. Hansen, 1909. 214 p.

1101 ————. Плутарх. О музыке. Перевод с греческого Н. Н. Томасова, с пояснительными и вступительиой статьей Е. М. Браудо, с приложением биографии Плутарха А. Н. Малеина. Мыслители о музыке, 1. Pétersbourg: Édition de l'état, 1922. 91 p.

1102 ————. *Moralia.* 15 vols. to date. Trans. Frank C. Babbitt, W. C. Helmbold, Phillip H. De Lacy and Benedict Einarson, P. A. Clement and H. B. Hoffleit, Edwin L. Meinar, Jr., F. H. Sandbach, H. N. Fowler, Lionel Pearson, and Harold Cherniss. Loeb Classical Library. Cambridge: Harvard University Press, 1927–76. xxxvii,468 + xiv,508 + xii,600 + xii,553 + xii,515 + xii,528 + xvi,618 + xii,528 + xii,454 + xii,491 + xii,242 + xii,590 + xxvi,516 + xvi,468 + xv,418 p.

De musica, 14:343–455.

1103 ————. *Plutarchi Moralia VI 3.* Edidit Konrat Ziegler. Leipzig: B. G. Teubner, 1966. xv,64 p.

1104 ————. Lasserre, François. *Plutarque, De la musique.* Texte, traduction, commentaire, précédés d'une étude sur l'éducation musicale dans la Grèce antique. Olten and Lausanne: URS Graf-Verlag, 1954. 185 p.

1105 ————. *Plutarchi vitae parallelae.* 5 parts in 3 vols. Ed. K. Ziegler. Leipzig: B. G. Teubner, 1964–71.

1106 ————. Smits, Joannes Pieter Hendrikus Maria. *Plutarchus en de Griekse muziek. De Mentaliteit van de intellectueel in de tweede eeuw na Christus.* Utrechtse bijdragen tot de muziekwetenschap, vol. 6. Bilthoven: Creyghton, 1970. 146 p.

1107 ————. Gamberini, Leopoldo. *Plutarco «della musica.»* Historiae musicae cultores, biblioteca, vol. 32. Firenze: L. S. Olschki, 1979. 357 p.

————. See also items 31, 227, 263–69, 354, 357, 658, 1028, 1264, and 1550.

1108 Podhorski, Felix. "De versu sotadeo." *Dissertationes philologicae vindobonenses* 5 (1895): 107–84.

Podlecki, A. See item 1371.

1109 Pöhlmann, Egert. "Antikenverständnis und Antikenmißverständnis in der Operntheorie der Florentiner Camerata." *Die Musikforschung* 22 (1969): 5–13.

1110 ———. *Denkmäler altgriechischer Musik.* Erlanger Beiträge zur Sprach- und Kunstwissenschaft, vol. 31. Nürnberg: Hans Carl, 1970. 160 p. + 24 plates.

1111 ———. *Griechische Musikfragmente: Ein Weg zur altgriechischen Musik.* Erlanger Beiträge zur Sprach- und Kunstwissenschaft, vol. 8. Nürnberg: Hans Carl, 1960. vi,84 p.

1112 ———. "Marius Victorinus zum Odengesang bei Horaz." *Philologus* 109 (1965): 134–40.

1113 ———. "Metrica e ritmica nella poesia e nella musica greca antica." In *Mousike: Metrica, ritmica e musica greca in memoria di Giovanni Comotti,* ed. Bruno Gentili and Franca Perusino, 3–15. Pisa: Istituti editoriali e poligrafici internazionali, 1995.

1114 ———. "Ein neues griechisches Musikfragment der Wiener Papyrussammlung." *Hermes* 94 (1966): 501–4.

1115 ———. "Die Notenschrift in der Überlieferung der griechischen Bühnenmusik." *Würzburger Jahrbücher für die Altertumswissenschaft* n. s. 2 (1976): 53–73.

1116 ———. "ΠΑΡΩΙΔΙΑ." *Glotta* 50 (1972): 144–56.

1117 ———. "Der Peripatetiker Athenodor über Wortakzent und Melodiebildung im Hellenismus." *Wiener Studien* 79 (1966): 201–13.

1118 ———. "Sulla preistoria della tradizione di testi e musica per il teatro." In *La musica in Grecia,* ed. Bruno Gentili and Roberto Pretagostini, 132–44. Storia e società. Roma-Bari: Laterza, 1988.

1119 ———. "Die Überlieferung der Musik in der antiken Welt." *Die Musikforschung* 44 (1991): 1–9.

———. See also item 694.

1120 Polidoro, Federigo. *Aristosseno e la sua scuola.* Atti della Academia Pontaniana, vol. 24, no. 14. Naples: Giannini, 1894. 18 p.

Poliziano, Angelo. See item 327.

1121 Pollux. *Iulii Pollucis Onomasticon.* Rec. Immanuel Bekker. Berlin: Nicolaus, 1846. iv,494 p.

1122 Pomeroy, Sarah. "Technikai kai Mousikai: The Education of Women in the Fourth Century and in the Hellenistic Period." *American Journal of Ancient History* 2 (1977): 51–68.

1123 *Pompeii and Its Museums.* Introduction by Michael Grant. Text by Antonio de Simone and Gemma Verchi. Great Museums of the World. New York and Milan: Newsweek and Arnoldo Mondadori Editore, 1979. 172 p.

Pompilio, Angelo. See item 1201.

1124 Porphyrius. Wallis, John. "Πορφυρίου εἰς τὰ ἁρμονικὰ Πτολεμαίου ὑπόμνημα. Nunc primum ex Codd. Mss. (Graece & Latine) editus." In *Operum* *mathematicorum*, 3:185–355. Oxoniae, e Theatro Sheldoniano, 1699.

1125 ————. *Porphyrios Kommentar zur Harmonielehre des Ptolemaios.* Ed. Ingemar Düring. Göteborgs Högskolas Årsskrift, vol. 38, no. 2. Göteborg: Elanders, 1932; reprint, New York: Garland, 1980. xliii,217 p.

The reprint includes Düring's text for the *Harmonica* of Claudius Ptolemy. See item 19 and 1150.

1126 ————. Düring, Ingemar. *Ptolemaios und Porphyrios über die Musik.* Göteborgs Högskolas Årsskrift, vol. 40, no. 1. Göteborg: Elanders, 1934; reprint, New York: Garland, 1980. 293 p.

————. See also items 19, 65, 202, 662, 1150, 1366, and 1422.

Porte, Jacques. See item 308.

Possevinus, Antonio. See items 466–67.

1127 Potiron, Henri. *Boèce: Théoricien de la musique grecque.* Paris: Bloud & Gay, 1961. 184 p.

1128 ————. "Les deux modes grecs." *Etudes grégoriennes* 12 (1971): 138–40.

1129 ————. *Les modes grecs antiques.* Paris: Desclée, 1950. 85 p.

1130 ————. "La notation grecque au temps d'Aristoxène." *Revue de musicologie* 50 (1964): 222–25.

1131 ————. "Les notations d'Aristide Quintilien et les harmonies dites Platoniciennes." *Revue de musicologie* 47 (1961): 159–76.

1132 ————. "L'Octave moyenne des voix dans la musique grecque." *Etudes grégoriennes* 14 (1973): 221–25.

1133 ————. "Valeur et traduction de la notation grecque." *Etudes grégoriennes* 15 (1975): 193–99.

1134 Potvin, Charles. "L'Art grec: La musique." *Revue de belgique* II/11 (1894): 276–90; 12 (1894): 279–94 and 391–409.

1135 Poupin, A. "La musique chez les Grecs." *Revue de la société des études historiques* IV/4 (1886): 286–97; 6 (1888): 327–41; and 7 (1889): 319–31.

Powell, John U. See item 974.

1136 Powers, Harold S. "Mode and Raga." *Musical Quarterly* 44 (1958): 448–60.

1137 Préaux, Claire. "Quelques échantillons papyrologiques de musique grecque." *Chronique d'Égypte* 5 (1930): 278–85.

1138 Pretagostini, Roberto. "Parola, metro e musica nella monodia dell' Upupa (Aristofane, «Uccelli» 227–262)." In *La musica in Grecia*, ed. Bruno Gentili and Roberto Pretagostini, 189–98. Storia e società. Roma-Bari: Laterza, 1988.

————. See also items 134, 153, 172, 356, 418, 506, 527, 531, 569, 748, 841, 924, 1118, 1139, 1202, 1252, 1599, 1610, and 1620.

1139 Privitera, G. Aurelio. "Il ditirambo come spettacolo musicale. Il ruolo di Archiloco e di Arione." In *La musica in Grecia*, ed. Bruno Gentili and Roberto Pretagostini, 123–31. Storia e società. Roma-Bari: Laterza, 1988.

1140 ———. "Il ditirambo da canto cultuale a spettacolo musicale." *Cultura e scuola* 43 (1972): 56–66.

1141 Proclus. *Sur le Premier Alcibiades de Platon.* 2 vols. Ed. and trans. A. Ph. Segonds. Collection des Universités de France. Paris: Les Belles Lettres, 1985–86. cl,474 p.

The two volumes are consecutively paginated.

1142 Prosdocimo de' Beldomandi. *Parvus tractatulus de modo monacordum dividendi.* Ed. and trans. Jan W. Herlinger. Greek and Latin Music Theory, vol. 4. Lincoln: University of Nebraska Press, 1987. x,182 p.

1143 Prudhommeau, Germaine. *La danse grecque antique.* 2 vols. Paris: Editions du Centre national de la recherche scientifique, 1965. 721 p.

1144 Psachos, Konstantin. "Aus der Geschichte der griechischen Musik." *Organon* 4 (1881): 36–38.

1145 Psellos, Michael. *Chronographie ou histoire d'un siècle de Byzance (976–1077).* 2 vols. Ed. and trans. Émile Renauld. Collection Byzantine. Paris: Les Belles Lettres, 1926–28. lxxxviii,154 + 199 p.

———. See also items 85, 1206, 1217, and 1279.

1146 Ptolemy, Claudius. Wallis, John. *Κλαυδίου Πτολεμαίου ἁρμονικῶν βιβλία γ. Harmonicorum libri tres. Ex Codd. MSS. undecim, nunc primum Graece editus.* Oxonii, e Theatro Sheldoniano, 1682; reprint in Monuments of Music and Music Literature in Facsimile, II/60, New York: Broude Brothers, 1977. [xvii],328 p.

1147 ———. Wallis, John. "Κλαυδίου Πτολεμαίου ἁρμονικῶν βιβλία γ. Ex Codd. Mss. editi; nova versione Latine, & notis, illustrati." In *Operum mathematicorum,* 3:1–152. Oxoniae, e Theatro Sheldoniano, 1699.

1148 ———. "A Familiar Explanation of the Greek Musical Modes [according to the doctrine of Ptolemy], in a Series of Letters." In *Letters, addressed chiefly to a young gentleman, upon subjects of literature: including a translation of Euclid's section of the canon; and his treatise on harmonic; with an explanation of the Greek musical modes, according to the doctrine of Ptolemy,* by Charles Davy, 2:413–77. 2 vols. Bury St. Edmonds: Printed for the author by J. Rackham, 1787.

A very free treatment of Ptolemy's theories.

1149 ———. "Ptolemäus, II, 5–11." In Boethius, *Fünf Bücher über die Musik,* sachlich erklärt von Oscar Paul, 278–326. Leipzig: F. E. C. Leuckart, 1872; reprint, Hildesheim: G. Olms, 1973.

1150 ———. *Die Harmonielehre des Klaudios Ptolemaios.* Ed. Ingemar Düring. Göteborgs Högskolas Årsskrift, vol. 36, no. 1. Göteborg: Elanders, 1930; reprint, New York: Garland, 1980. cvi,147 p.

The reprint includes Düring's text for the commentary of Porphyrius. See items 19 and 1125.

1151 ————. Baker, Thomas W. "Ptolemy's Treatise on Music: A Partial Translation." Ph.D. dissertation, Columbia, 1974. [iii],100 p.

1152 ————. "The *Harmonics*." In *Greek Musical Writings*, 2 vols., ed. Andrew Barker, 2:275–391. Cambridge Readings in the Literature of Music. Cambridge: Cambridge University Press, 1984–89.

————. See also items 19, 65, 142–43, 223, 508, 553, 560, 662, 766–67, 852, 893, 975, 1052, 1057, 1126, 1208, 1332, 1359, 1376, 1383, 1405, 1458–59, and 1499.

1153 Quasten, Johannes. *Musik und Gesang in den Kulten der heidnischen Antike und christlichen Frühzeit.* 2d ed. Liturgiewissenschaftliche Quellen und Forschungen, vol. 25. Münster i. W.: Aschendorff, 1973. xii,284 p. and 38 plates.

Pages vii–274 are an unaltered reprint of the 1930 edition, in which the series title was Liturgiegeschichtliche Quellen und Forschungen, vol. 25. A slightly different version of the second edition exists in English as *Music and Worship in Pagan and Christian Antiquity.* Trans. Boniface Ramsey, O.P. NPM Studies in Church Music and Liturgy. Washington, D.C.: National Association of Pastoral Musicians, 1983. xii,243 p.

Quintilianus, Marcus Fabius. See item 995.

1154 Raasted, Jørgen, ed. *The Hagiopolites: A Byzantine Treatise on Musical Theory.* Cahiers de l'Institut du moyen-âge grec et latin, vol. 45. Copenhagen: Université de Copenhague, 1983. 99 p.

1155 Radermacher, Ludwig. "Ein Bruchstück des Damon." *Wiener Studien* 56 (1938): 110–11.

1156 ————. "Metrisches—I. Damon und das ἡρῷον." *Wiener Studien* 59 (1941): 1–3.

Raffan, John. See item 270.

Ramsey, Boniface. See item 1153.

1157 Ramsey, John T. "Cicero *Pro Murena* 29: The Orator as *Citharoedus,* the Versatile Artist." *Classical Philology* 79 (1984): 220–25.

1158 Ramsey, W. M. "Unedited Inscriptions of Asia Minor." *Bulletin de correspondance hellénique* 7 (1883): 277–78.

1159 Randel, Don M. "Al-Fārābī and the Role of Arabic Music Theory in the Latin Middle Ages." *Journal of the American Musicological Society* 29 (1976): 173–88.

————. See also item 120.

Rausch, Alexander. See item 688.

1160 Rea, J. R. "2687. Aristoxenus, 'Ῥυθμικὰ Cτοιχεῖα?" *Oxyrhynchus Papyri* 49 (1968): 15–25 (a photograph of the reassembled papyrus appears as plate II).

See also items 80, 87, 529, 801, and 1253.

1161 Reese, Gustave. *Music in the Middle Ages.* New York: Norton, 1940. xvii,502 p.

Chapter 2: "Greece and Rome," pp. 11–53.

1162 ————. "Perspectives and Lacunae in Musicological Research: Inaugural Lecture." In *Perspectives in Musicology*, ed. Barry S. Brook, Edward O. D. Downes, and Sherman van Solkema, 1–14. New York: Norton, 1972.

————. See also items 366, 563, 859, and 1549.

Regenbogen, Otto. See item 707.

Regino of Prüm. See item 198.

1163 *Regner, Johannes. "Platos Musiktheorie. Eine Studie zur griechischen Musikgeschichte." Ph.D. dissertation, Halle, 1924.

1164 Regnier, Anne-Marie. "Un type de concours musical dans l'antiquité. Les éprueves musicales aux jeux pythiques et la signification des concours dans la Grèce archaïque et la période classique." In *Hommage à Charles van den Borren*, 260–82. Anvers: N. V. de Nederlandsche Boekhandel, 1945.

1165 Reich, Hermann. "Antike und moderne Mimus-Oper und -Operette und der Papyrusfund von Oxyrhynchos." *Die Musik* 18 (1925–26): 85–97.

1166 ————. "Eine antike Oper aus Ägypten." *Der Auftakt* 5 (1925): 1–8.

1167 Reid, Merry Lou. "Musical Axiologies of Antiquity." M.M. dissertation, Florida State University, 1973. 163 p.

Reifferscheid, August. See item 336.

1168 Reimann, Heinrich. *Disputationis de prosodiorum similiumque apud Graecos carmina natura nuper editae additamentum.* Beilage zum Jahresbericht des königl. kathol. Gymnasiums zu Gleiwitz: Progr.-No. 169. Gleiwitz: C. F. Neumann, 1886. 10 p.

1169 ————. *Studien zur griechischen Musik-Geschichte. A. Der Nόμος.* Programm des Gymnasiums Ratibor. Leipzig: G. Fock, 1882. 24 p.

1170 ————. *Studien zur griechischen Musik-Geschichte. B. Die Prosodien und die denselben verwandten Gesänge der Griechen.* Programm des Gymnasiums Glatz. Leipzig: G. Fock, 1885. 23 p.

1171 ————. "Zur Geschichte der byzantinischen Musik. IV. Die Theorie des Manuel Bryennios." *Vierteljahrsschrift für Musikwissenschaft* 5 (1889): 322–44 and 373–95.

1172 Reinach, Théodore. "Un ancêtre de la musique d'Eglise." *Revue musicale* 3 (1922): 8–25.

1173 ————. "Aristoxène, Aristote et Théophraste." In *Festschrift für Theodor Gomperz dargebracht zum 70. Geburtstage am 29. III. 1902 von Schülern, Freunden, Collegen*, 75–79. Wien: A. Hölder, 1902.

1174 ————. "Deux fragments de musique grecque." *Revue des études grecques* 9 (1896): 186–215.

1175 ————. "Euripides und der Choreut." *Hermes* 45 (1910): 151–55.

1176 ————. "Un fragment d'Ion de Chios." *Revue des études grecques* 14 (1901): 8–19.

1177 ————. "Fragments musicologiques inédits." *Revue des études grecques* 10 (1897): 313–27.

1178 ————. "La guitare dans l'art grec." *Revue des études grecques* 8 (1895): 371–78.

1179 ————. "L'Hymne à la muse." *Revue des études grecques* 9 (1896): 1–22.

1180 ————. *Les Hymnes delphiques à Apollon avec notes musicales.* Paris: Fontemoing, 1912. 23 p. + plate.
=*Fouilles de Delphes* 3, no. 2 (1909–13): 147–69, 332.

1181 ————. "Une ligne de musique byzantine." *Revue archéologique* IV/18 (1911): 282–89.

1182 ————. "La musique des hymnes de Delphes." *Bulletin de correspondance hellénique* 17 (1893): 584–610.

1183 ————. "La musique du nouvel hymne de Delphes." *Bulletin de correspondance hellénique* 18 (1894): 363–89.

1184 ————. *La musique grecque.* Paris: Payot, 1926; reprint, Paris: Edition Aujourd'hui, 1976. 208 p.

1185 ————. *La musique grecque et l'hymne à Apollon.* Conférence faite à l'Association pour l'encouragement des études grecques. Paris: E. Leroux, 1894. 20 p.

1186 ————. "La musique des sphères." *Revue des études grecques* 13 (1900): 432–49.

1187 ————. "Nouveaux fragments de musique grecque." *Revue archéologique* V/10 (1919): 11–27.

1188 ————. "Nouveaux fragments d'hymnes accompagnés de notes de musique." *Bulletin de correspondance hellénique* 17 (1893): 569–83.

1189 ————. "Les nouveaux fragments rhythmiques d'Aristoxène." *Revue des études grecques* 11 (1898): 389–418.

1190 ————. "Un nouvel hymne à Apollon." *Bulletin de correspondance hellénique* 18 (1894): 345–62.

1191 ————. "Une page de musique grecque." *Revue de Paris* 1 (1894): 204–24.

————. See also items 622 and 1099.

1192 Reinach, Théodore, and Eugène d'Eichthal. "Notes sur les problèmes musicaux dits d'Aristote." *Revue des études grecques* 5 (1892): 22–52.

1193 Reisch, Emil. "De musicis graecorum certaminibus capita quattuor." Ph.D. dissertation, Wien, 1885. 123 p.

1194 Reiser, Theo. *Das Geheimnis der pythagoreischen Tetraktys.* Harmonikale Studien, vol. 3. Heidelberg: L. Schneider, 1967. 71 p. + 1 plate.

1195 Ρεμαντᾶς, Ἀδαμάντιος, καὶ Προκόπιος Δ. Ζαχαρίας. *Ἀρίων: Ἡ μουσικὴ τῶν Ἑλλήνων ὡς διεσώθη ἀπὸ τῶν ἀρχαιοτάτων χρόνων μέχρι τῆς σήμερον.* Ἀθῆναι: Ζαγκουρόγλου, 1917. 36 p. + 64 p. of music.

Renauld, Émile. See item 1145.

1196 Renehan, Robert. "The Derivation of ῥυθμός." *Classical Philology* 58 (1963): 36–38.

1197 Restani, Donatella. "Il *Chirone* di Ferecrate e la 'nuova' musica greca." *Rivista italiana di musicologia* 18 (1983): 139–92.

1198 ———. "Dionysos tra αὐλός e κιθάρα: un percorso di iconografia musicale." In *Dionysos: Mito e mistero. Atti del convegno internazionale Comacchio 3–5 novembre 1989*, ed. Fede Berti, 379–95. Comacchio: Comune di Comacchio, 1991.

1199 ———. "In margine al *Chirone* di Ferecrate." *Rivista italiana di musicologia* 19 (1984): 203–5.

1200 ———. *L'Itinerario di Girolamo Mei dalla «poetica» alla musica, con un' appendice di testi.* Studi e testi per la storia della musica, vol. 7. Firenze: L. S. Olschki, 1990. 218 p.

1201 ———. "Martini studioso di musica greca." In *Padre Martini: Musica e cultura nel settecento europeo*, ed. Angelo Pompilio, 27–54. Firenze: L. S. Olschki, 1987.

1202 ———. "Problemi musicali nel XIV libro dei «Deipnosophistai» di Ateneo: una proposta di lettura." In *La musica in Grecia*, ed. Bruno Gentili and Roberto Pretagostini, 26–34. Storia e società. Roma-Bari: Laterza, 1988.

1203 ———. "I suoni del telaio. Appunti sull'universo sonoro degli antichi Greci." In *Mousike: Metrica, ritmica e musica greca in memoria di Giovanni Comotti*, ed. Bruno Gentili and Franca Perusino, 93–109. Pisa: Istituti editoriali e poligrafici internazionali, 1995.

1204 Reynolds, L. D.; and N. G. Wilson. *Scribes and Scholars: A Guide to the Transmission of Greek and Latin Literature.* 3d ed. Oxford: Clarendon, 1991. ix,321 p. + 16 plates.

1205 Richter, Lukas. "Antike ästhetische Theorien zur gesellschaftlichen Funktion der griechischen Tragödie." In *Die griechische Tragödie in ihrer gesellschaftlichen Funktion*, hrsg. Heinrich Kuch, 173–92. Veröffentlichungen des Zentralinstituts für Alte Geschichte und Archäologie der Akademie der Wissenschaften der DDR, vol. 11. Berlin: Akademie-Verlag, 1983.

1205a ———. "Antike Thematik und byzantinische Aneignung: Zu einem musiktheoretischen Text aus der Palaiologenzeit." *Neues musikwissenschaftliches Jahrbuch* 5 (1996): 9–39.

1206 ———. "Antike Überlieferungen in der byzantinischen Musiktheorie." *Deutsches Jahrbuch der Musikwissenschaft* 6 (1962): 75–115.

Revised and expanded in *Acta musicologica* 70 (1998): 133–208.

1207 ———. "Der antiklassischen Trend in der griechischen Musik der Klassik." In *Das Problem des klassischen als historisches, archäologisches und philosophisches Phänomen: Görlitzer Eirene-Tagung 10.–14. 10. 1967. Schriften der Sektion für Altertumswissenschaft* 55/4:29–38. Berlin: Akademie-Verlag, 1969.

1208 ———. "Die Aufgaben der Musiklehre nach Aristoxenos und Klaudios Ptolemaios." *Archiv für Musikwissenschaft* 15 (1958): 209–29.

1209 ———. "Die Beziehung zwischen Theorie und Praxis der Musik im aristotelischen Protreptikos." *Hermes* 88 (1960): 177–88.

1209a ————. "Griechische Planetentonleitern in römischer Rezeption." *Revista di musicologia* 16 (1993): 53–62.

1210 ————. "Griechische Traditionen in Musikschrifttum der Römer: Censorinus, *De die natali*, Kap. 10." *Archiv für Musikwissenschaft* 21 (1965): 69–98.

1211 ————. "Instrumentalbegleitung zur attischen Tragödie." *Das Altertum* 24 (1978): 150–59.

1212 ————. "Die Musik der griechischen Tragödie und ihre Wandlungen unter veränderten historischen Bedingungen." In *Die griechische Tragödie in ihrer gesellschaftlichen Funktion*, hrsg. Heinrich Kuch, 115–39. Veröffentlichungen des Zentralinstituts für Alte Geschichte und Archäologie der Akademie der Wissenschaften der DDR, vol. 11. Berlin: Akademie-Verlag, 1983.

1213 ————. "Musikalische Aspekte der attischen Tragödienchöre." *Beiträge zur Musikwissenschaft* 14 (1972): 247–98.

1214 ————. "Das Musikfragment aus dem Euripideischen Orestes." *Deutsches Jahrbuch der Musikwissenschaft* 16 (1973): 111–49.

1215 ————. "Die neue Musik der griechischen Antike." *Archiv für Musikwissenschaft* 25 (1968): 1–18 and 134–47.

1216 ————. "Platons Stellung zur praktischen und spekulativen Musiktheorie seiner Zeit." In *Bericht über den Internationalen Musikwissenschaftlichen Kongress: Hamburg 1956*, hrsg. Walter Gerstenberg, 196–202. Kassel: Bärenreiter, 1957.

1217 ————. "'Psellus' Treatise on Music' in Mizler's 'Bibliothek.'" In *Studies in Eastern Chant*, ed. Miloš Velimirović, 2:112–28. London: Oxford University Press, 1971.

Edited version of "'Des Psellus vollständiger kurzer Inbegriff der Musik' in Mizlers 'Bibliothek': ein Beitrag zur Rezeption der byzantinischen Musiktheorie im 18. Jahrhundert," *Beiträge zur Musikwissenschaft* 9 (1967): 45–54.

1218 ————. "Die Rolle der Musik in der klassischen griechischen Tragödie." In *The Musical Theatre. Papers from a Colloquium Held as Part of the Mezinárodní Hudební Festival (International Musical Festival) at Brno, 1980*, ed. Rudolf Pečman, 217–26. Musical Festival in Brno, vol. 15. Brno: Mezinárodní Hudební Festival, 1984.

1219 ————. "Die Stellung der Musik in der aristotelischen 'Metaphysik.'" In *Aristoteles als Wissenschaftstheoretiker: Eine Aufsatzsammlung*, hrsg. Johannes Irmscher und Reimar Müller, 46–49. Schriften zur Geschichte und Kultur der Antike, vol. 22. Berlin: Akademie-Verlag, 1983.

1220 ————. "Der Stilwandel der griechischen Musik zur Zeit der Poliskrise." In *Hellenische Poleis: Krise, Wandlung, Wirkung*, ed. Elisabeth Charlotte Welskopf, 1450–71. Berlin: Akademie-Verlag, 1974.

1221 ————. "Uwagi na temat fragmentu muzycznego z tragedii Eurypidesa *Orestes*." *Muzyka* 14 (1969): 3–13.

1222 ———. "Zeugnisse zur praktischen Musiklehre der Griechen in vorplatonischer Zeit." In *Acta antiqua Philippopolitana: studia historica et philologica,* 197–206. Serdicae, In aedibus Typographicis Academiae Scientiarum Bulgaricae, 1963.

1223 ———. "Zum Musikfragment aus dem euripideischen Orestes." *Acta Conventus XI Eirene, 21–25 Oct. 1968,* 273–81. Warszaw: Ossolineum, 1971.

1224 ———. "Zum Stilwandel der griechischen Musik im 5./4. Jahrhundert." *Forschungen und Fortschritte* 44 (1967): 114–16.

1225 ———. *Zur Wissenschaftslehre von der Musik bei Platon und Aristoteles.* Deutsche Akademie der Wissenschaften zu Berlin. Schriften der Sektion für Altertumswissenschaft, vol. 23. Berlin: Akademie-Verlag, 1961. xi,202 p.

1226 Richter, Will. "ΣΥΜΦΩΝΙΑ: Zur Vor- und Frühgeschichte eines musikologischen Begriffs." In *Convivium musicorum: Festschrift Wolfgang Boetticher zum sechzigsten Geburtstag am 19. August 1974,* hrsg. Heinrich Hüschen und Dietz-Rüdiger Moser, 264–90. Berlin: Merseburger, [1974].

Riedel, Friedrich Wilhelm. See item 855.

Riedel, Johannes. See item 1538.

1227 Riemann, Hugo. "Die dorische Tonart als Grundskala der griechischen Notenschrift." *Sammelbände der Internationalen Musikgesellschaft* 4 (1902–3): 558–69.

1228 ———. *Handbuch der Musikgeschichte.* Vol. 1, pt. 1. Leipzig: Breitkopf und Härtel, 1919. xvi,276 p.

1923 edition (xviii,276 p.) with commentary by Alfred Einstein.

1229 ———. *Katechismus der Musikgeschichte. I. Teil. Geschichte der Musikinstrumente und Geschichte der Tonsysteme und der Notenschrift. II. Teil. Geschichte der Tonformen.* Hesse's illustrierte Katechismen, vols. 2–3. Leipzig: Hesse, 1906. viii,161 + iv,230 p.

———. See also item 1041.

1230 Riethmüller, Albrecht. "Die Hinfälligkeit musiktheoretischer Prinzipien nach Sextus Empiricus, Adversus musicos." *Archiv für Musikwissenschaft* 32 (1975): 184–95.

"Festheft für Johannes Lohmann."

1231 ———. "Logos und Diastema in der griechischen Musiktheorie." *Archiv für Musikwissenschaft* 42 (1985): 18–36.

———. See also item 199.

1232 Riethmüller, Albrecht, and Frieder Zaminer, eds. *Die Musik des Alertums.* Neues Handbuch der Musikwissenschaft, 1. Laaber: Laaber-Verlag, 1989. x,358 p.

1233 Righini, Pietro. *La musica greca: Analisi storico-tecnica.* Collana di studi musicali, vol. 13. Padova: G. Zanibon, 1976. 76 p.

1234 Riley, James. "Ethos in Greek Music." M.M. thesis, College-Conservatory of Music of Cincinnati, 1948. 89 p.

1235 Ring, F. "Zur altgriechischen Solmisationslehre." *Archiv für Musikforschung* 3 (1938): 193–208.

Rios, Rosetta Da. See item 84.

1236 Rispoli, Gioia M. "Elementi fisica e di etica Epicurea nella teoria musicale di Filodemo di Gadara." In *Harmonia mundi: Musica e filosofia nell'antichità: Music and Philosophy in the Ancient World,* ed. Robert W. Wallace and Bonnie MacLachlan, 69–103. Biblioteca di Quaderni urbinati di cultura classica, vol. 5. Roma: Edizioni dell'Ateneo, 1991.

1237 Ritoók, Zsigmond, ed. and trans. *Források az ókori görög zeneesztétika történetéhez.* Budapest: Akadémiai, 1982. 591 p.

1238 Ritter, Frédéric Louis. *Manual of Musical History from the Epoch of Ancient Greece to Our Present Time.* 2d ed. London: Reeves, 1892. viii,58 p.

1239 Rivaud, Albert. "Études platoniciennes, II: Plato et la musique." *Revue d'histoire de la philosophie* 3 (1929): 1–30.

1240 *Roberts, Helen Dalby. "Ancient Greek Stringed Instruments, 700–200 B.C." Ph.D., University of Reading, 1974.

1241 ————. "Reconstructing the Greek Tortoise-Shell Lyre." *World Archaeology* 12 (1981): 303–12.

1242 ————. "The Technique of Playing Ancient Greek Instruments of the Lyre Type." In *Music and Civilization,* ed. T. C. Mitchell. *British Museum Yearbook* 4 (1980): 43–76.

Roberts, W. Rhys. See item 421.

1243 Rockstro, William S. *A General History of Music from the Infancy of the Greek Drama to the Present Period.* London: Sampson Low, 1897. 55 p.

Rogers, Benjamin Bickley. See item 52.

1244 Romagnoli, Ettore. *Musica e poesia nell' antica Grecia.* Biblioteca di cultura moderna, vol. 43. Bari: G. Laterza e Figli, 1911. 368 p.

1245 ————. *Nel regno d'Orfeo: Studi sulla lirica e la musica greca.* Bologna: N. Zanichelli, 1921. vi,291 p.

1246 ————. "Nuovi frammenti di musica greca." *Rivista musicale italiana* 27 (1920): 274–313.

1247 Rome, A. "L'Origine de la prétendue mélodie de Pindare." *Études classiques* 1 (1932): 3–11.

1248 ————. "Pindare ou Kircher." *Études classiques* 4 (1935): 337–50.

Ronga, Luigi. See item 925.

1249 Roos, Ervin. "Die tragische Orchestik im Zerrbild der altattischen Komödie." *Excursus* 2 (1951): 209–35.

1250 Rosengren, Er[cole]. "De origine Aristoxeni elementorum harmonicorum codicis upsaliensis." Ph.D. dissertation, Hernösand, 1888. 23 p.

Ross, W. D. See item 60.

1251 Rossbach, August, and Rudolf Westphal. *Theorie der musischen Künste der Hellenen*. 4 vols. in 3. Leipzig: B. G. Teubner, 1885–89; reprint, Hildesheim: G. Olms, 1966. xl,305 + liv,240 + xlvi,368 + lxxii,870 p.

Vol. 1: *Griechische Rhythmik* (1885), by R. Westphal; vol. 2: *Griechische Harmonik und Melopoeie* (1886), by R. Westphal; vol. 3, pt. 1: *Allgemeine Theorie der griechischen Metrik* (1886); and vol. 3, pt. 2: *Griechische Metrik mit besonderer Rücksicht auf die Strophengattungen und die übrigen melischen Metra* (1889), by A. Rossbach and R. Westphal.

1252 Rossi, Enrico. "La dottrina dell' «éthos» musicale e il simposio." In *La musica in Grecia*, ed. Bruno Gentili and Roberto Pretagostini, 238–45. Storia e società. Roma-Bari: Laterza, 1988.

1253 Rossi, L. E. "POxy 9 + POxy 2687: Trattato ritmico-metrico." In *Aristoxenica, Menandrea, fragmenta philosophica*, ed. Francesco Adorna, 11–30. Studi e testi per il corpus dei papiri filosofici greci e latini, iii; Accademia toscana di scienze e lettere «La Colombaria», Studi, xci. Florence: Olschki, 1988.

See also items 80, 87, 529, 801, and 1160.

1254 Roussel, Louis. "Bel canto et Sophocle." In *Mélanges offerts à M. Octave Navarre par ses élèves et ses amis*, 371–74. Toulouse: E. Privat, 1935.

1255 Roussier, Pierre Joseph. *Mémoire sur la musique des anciens oú l'on expose le principe des proportions authentiques, dites de Pythagore, & de divers systêmes de musique chez les Grecs, les Chinois, & les Egyptiens. Avec un parallèle entre le systême des Egyptiens & celui des modernes*. Paris: Lacombe, 1770. xxiv,252 p.

1256 Rowbotham, John F. *A History of Music*. London: Bentley, 1893. xii,419 p.

Rowell, Lewis. See item 88.

1257 Ruelle, Charles-Emile. *Le chant gnostico-magique des sept voyelles grecques*. Mémoires lus au congrès international de l'histoire comparée, 8e section, histoire musicale, Paris, 1900. Solesmes: Saint-Pierre, 1901. 28 p.

1258 ————. "Corrections proposées dans Aristides Quintilien, sur la musique. P. 26 de Meibomius; p. 16 d'Alb. Jahn." *Revue de philologie* 20 (1896): 156–58.

1259 ————. "Corrections proposées dans l'Anonyme de Bellermann." *Revue de philologie* 32 (1908): 28–29.

1260 ————. *Deux textes grecs anonymes concernant le canon musical heptacorde puis octacorde publié d'après le Ms. N-72 de la Biblioteca Nacional de Madrid avec une traduction française et des notes*. Paris: Baur, 1878. 23 p.

1261 ————. "Le diagramme musical de Florence." *Sammelbände der Internationalen Musikgesellschaft* 7 (1905–6): 508–13.

1262 ————. "Étude sur Aristoxène et son école." *Revue archéologique* 14 (1858): 413–22 and 528–55.

1263 ————. *Études sur l'ancienne musique grecque.* Paris: Impr. nationale, 1875. 132 p.
=*Archives des missions scientifiques et littéraires* III/2 (1875): 497–627.

1264 ————. *Études sur l'ancienne musique grecque. Plutarque, 'de Musica,' Ch. XI.* Paris: E. Leroux, 1900 7 p.
=*Revue archéologique* 36 (1900): 326–32.

1265 ————. "Le fragment musical d'Oxyrhynchos." *Revue de philologie* 29 (1905): 201–4.

1266 ————. "John Wallis et la musicologie grecque." *Revue des études grecques* 26 (1913): 77–78.

1267 ————. "Locus desperatus dans Aristoxène, Éléments harmoniques." *Revue de philologie* 30 (1906): 271–74.

1268 ————. "Le monocorde, instrument de musique." *Revue des études grecques* 10 (1897): 309–12.

1269 ————. *Le musicographe Alypius. corrigé par Boèce.* Paris: Impr. nationale, 1895. 14 p.
=*Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres* IV/22 (1894): 458–68.

1270 ————. "Le musicographe Aristide Quintilien." *Sammelbände der Internationalen Musikgesellschaft* 11 (1909–10): 313–23.

1271 ————. "Notice et variantes d'un manuscrit de Strasbourg contenant les éléments harmoniques d'Aristoxène." *Revue de philologie* 6 (1882): 37–51.

1272 ————. *Notice et variantes d'un manuscrit grec relatif à la musique, qui a péri pendant le bombardement de Strasbourg.* Paris: Donnaud, n.d. 4 p.

1273 ————. "Le papyrus musical de Hibeh." *Revue de philologie* 31 (1907): 235–40.

1274 ————. "Le papyrus musical d'Euripide." *Revue des études grecques* 5 (1892): 265–80.

1275 ————. "Quelques mots sur la musique des Grecs anciens et modernes." *Annuaire de l'Association pour l'encouragement des études grecques en France* 12 (1878): 238–45.

1276 ————. "Rapports sur une mission littéraire et philologique en Espagne." *Le Bibliographie musical* 22 (1875): 375–86.

1277 ————. "La solmisation chez les anciens Grecs." *Sammelbände der Internationalen Musikgesellschaft* 9 (1907–8): 512–30.

1278 ————. "Sur l'authenticité probable de la division du canon musical attribuée à Euclide." *Revue des études grecques* 19 (1906): 318–20.

1279 ————. *Traduction de quelques textes grecs inédits recueillis à Madrid et à l'Escurial. Lettres de Psellus. Fragments anonymes sur la musique et sur l'accentuation grecque. Table des chapitres du* *dynaméron du médecin Elius Promotus.* Paris: Durand et Pedone-Lauriel, 1875. 31 p.

————. See also items 26, 54, 58, 77, 329, 1011, and 1352.

1280 Rupprecht, Karl. "Sophokles als κιθαριστής." *Philologus* 75 (1920): 213–15.

1281 Ryffel, E. "Eukosmia. Ein Beitrag zur Wiederherstellung des Areopagiticos des Damon." *Museum helveticum* 4 (1947): 23–38.

1282 Sacchi, Giovenale. *Della natura e perfezione della antica musica de' Greci e della utilità che ci potremo noi promettere dalla nostra applicandola secondo il loro esempio alla educazione de' giovanni.* Milano: Antonio Magni nella stamperia Malatesta, 1778. 207 p.

1283 Sachs, Curt. *Geist und Werden der Musikinstrumente.* Berlin: D. Reimer, 1929. xi,282 p. + 48 plates.

1284 ————. "Die griechische Gesangsnotenschrift." *Zeitschrift für Musikwissenschaft* 7 (1924–25): 1–5.

1285 ————. "Die griechische Instrumentalnotenschrift." *Zeitschrift für Musikwissenschaft* 6 (1923–24): 289–301.

1286 ————. "Griechische Musik und der Orient." *Musica* 12 (1958): 518–21.

1287 ————. *The History of Musical Instruments.* New York: Norton, 1940. 505 p.

1288 ————. "Lituus und Karnyx." In *Festschrift zum 90. Geburtstage Sr. Exz. des wirklichen geheimen Rates Rochus Freiherrn von Liliencron überreicht von Vertretern deutscher Musikwissenschaft,* 241–46. Leipzig: Breitkopf und Härtel, 1910.

1289 ————. "Muses and Scales." In *Essays on Music in Honor of Archibald Thompson Davison by His Associates,* 3–8. Cambridge: Harvard University Department of Music, 1957.

1290 ————. *Die Musik der Antike.* Handbuch der Musikwissenschaft, vol. 8/3. Wildpark-Potsdam: Athenaion, 1928. 32 p.

1291 ————. *Musik des Altertums.* Breslau: Jedermanns Bücherei, 1924. 96 p.

1292 ————. *Real-Lexikon der Musikinstrumente.* 2d enl. ed. New York: Dover Publications, 1964. xxiii,452 p.

1293 ————. *Rhythm and Tempo.* New York: Norton, 1953. 391 p.

1294 ————. *The Rise of Music in the Ancient World: East and West.* New York: Norton, 1943. 324 p.

1295 ————. "Über eine bosnische Doppelflöte." *Sammelbände der Internationalen Musikgesellschaft* 9 (1907–8): 313–18.

1296 ————. *Vergleichende Musikwissenschaft in ihren Grundzügen.* Leipzig: Quelle und Meyer, 1930. vii,87 p.

1297 ————. *Vergleichende Musikwissenschaft: Musik der Fremdkulturen.* 2d ed. Heidelberg: Quelle und Meyer, 1959. 76 p.

1298 ————. *The Wellsprings of Music.* Ed. Jaap Kunst. The Hague: M. Nijhoff, 1962; New York: McGraw-Hill, 1965. xi,228 p.

————. See also item 1549.

Sachs, Klaus-Jürgen. See item 199.

1299 Sack, Ernst. *Platons Musikaesthetik*. Stuttgart: Deutscher Apotheker-Verlag, 1959. 42 p.

Sadie, Stanley. See item 1597.

1300 Salazar, Adolfo. *La música en la cultura griega*. Teoría y práctica de la musica a través de la historia, vol. 1. México: El Colegio de México, 1954. 674 p.

1301 ————. "La música en la edad homérica." *Anuario musical* 6 (1951): 107–54.

Sallmann, Nicolaus. See item 296.

1302 Самойлоб, А. "Алипиевы ряды древнегреческого музыкального письма." *Известия общества археологии, истории и этнографии при Казанском университете* 30 (1920): 354-495.

1303 ———— [Samojloff, A.]. "Die Alypius'schen Reihen der altgriechischen Tonbezeichnung und die Demonstration ihres einheitlichen Konstruktionsplanes vermittelst einer Schablone." *Archiv für Musikwissenschaft* 6 (1924): 383–400.

1304 Samuel, Adolphe. "La musique dans l'antiquité, d'après Fr. Aug. Gevaert." *Revue de belgique* 37 (1881): 297–310.

See item 546.

Sandbach, F. H. See item 1102.

1305 Sanden, Heinrich. *Antike Polyphonie*. Heidelberg: Winter Universitäts-Verlag, 1957. 83 p.

1306 Sandys, John Edwin. "῾Αρμονία and τόνος in Greek Music." *Classical Review* 8 (1894): 397.

————. See also item 1081.

1307 Satyrus. *Vita di Euripide*. Ed. Graziano Arrighetti. Università degli studi di Pisa. Istituti di archeologia, filologia classica e storia antica. Studi classici e orientali, vol. 13. Pisa: Libreria Goliardica Editrice, 1964. 168 p.

1308 Schaerer, René. *’Επιστήμη et Τέχνη: Étude sur les notions de connaissance et d'art d'Homère à Platon*. Macon: Protat Frères, 1930. xii,220 p.

1309 Schäfer, M. "Diogenes als Mittelstoiker." *Philologus* 91 (1936): 174–96.

1310 Schäfke, Rudolf. *Geschichte der Musikästhetik in Umrissen*. Berlin: M. Hesse, 1934. xviii,450 p.

————. See also items 47 and 49.

1311 Schatkin, Margaret A. "Idiophones of the Ancient World." *Jahrbuch für Antike und Christentum* 21 (1978): 147–72.

1312 Schauenburg, Konrad. "Hercules musikos." *Jahrbuch des deutschen archäologischen Instituts* 94 (1979): 49–76.

1313 Scheda, Gunther. "Planeten und Sphärenmusik in der neronischen Kaiserideologie." *Hermes* 94 (1966): 381–84.

1314 Scheithauer, Andrea. "Musik, musikalische Bildung und soziales Ansehen im frühen Griechentum." *Archiv für Musikwissenschaft* 53 (1996): 1–20.

1315 Scheltema, Hermann Jan. "De antiphonia." *Mnemosyne* 60 (1932): 239–53.

1316 Schlecht, Raym. "Die alten Tonarten und die moderne Musik." *Monatshefte für Musikgeschichte* 12 (1880): 48–52 and 55–63.

1317 Schleicher, Karl. *Über das Verhältnis der griechischen zur modernen Musik.* Zu den öffentlichen Prüfungen im Herzoglichen Gymnasium zu Cöthen. Donnerstag den 11. April 1878. Cöthen: P. Schettlers, 1878. 40 p.

1318 Schlesinger, Kathleen. "Further Notes on Aristoxenus and Musical Intervals." *Classical Quarterly* 27 (1933): 88–96.

1319 ————. *The Greek Aulos.* London: Methuen, 1939; reprint, Groningen: Bouma, 1970. 1,577 p. + 1 table.

1320 ————. "The Greek Foundations of the Theory of Music." *The Musical Standard* n. s. 27 (1926): 23–24, 44 –46, 62–63, 96–98, 109–10, 134–36, 162–64, 177–78, 197–98; 28 (1926): 31–32, and 44–45.

1321 ————. "The Harmonia." *Music Review* 5 (1944): 7–39 and 119–41.

————. See also item 1050.

1322 Schmidt, J. H. Heinrich. *Die antike Compositionslehre, aus den Meisterwerken der griechischen Dichtkunst erschlossen. Text und Schemata der lyrischen Partien bei Sophokles und Aristophanes.* Leipzig: F. C. W. Vogel, 1869. xx,532,ccclxxv p.

1323 ————. *Die Eurhythmie in den Chorgesängen der Griechen.* Die Kunstformen der griechischen Poesie und ihre Bedeutung, vol. 1. Leipzig: F. C. W. Vogel, 1868. xxiv,439 p.

Schmidt, Mauricius. See item 647.

1324 Schmidt, Max C. P. *Musikalische Studien.* Altphilologische Beiträge, vol. 3. Leipzig: Dürr, 1909. 94 p.

1325 Schmidt, Moritz. "Zum Anonymus de musica sec. 98." *Philologus* 31 (1872): 577–84.

Schmidt-Görg, Joseph. See item 1505.

1326 Schneider, Albert. *Zur Geschichte der Flöte im Alterthum.* Zürich: Schulthess, 1890. 68 p.

"Festgabe der Allgemeinen Musikgesellschaft in Zürich zum Jubiläum des 25jährigen Kapellmeisteramtes des Herrn Dr. Friedrich Hegar von Zürich."

1327 Schneider, K. "Plectrum." *Real-Enzyklopädie der klassischen Altertumswissenschaft* 41 (1951): 187–89.

1328 Schneider, Marius. "Primitive Music." In *Ancient and Oriental Music,* ed. Egon Wellesz, 1–82. New Oxford History of Music, vol. 1. London: Oxford University Press, 1957.

Schneider, Max. See item 1482.

1329 Schneider-Herrmann, G. "Die 'kleine Leiter': Addenda zum Xylophon auf italischen Vasen." *BABESCH: Bulletin antike Beschaving* 52–53 (1977–78): 265–67 and 277–78.

1330 Schoen, Max. *The Psychology of Music*. New York: Ronald Press, 1940. vii,258 p.

———. See also item 944.

1331 Schoene, Hermann. "De Aristoxeni περὶ τῆς Ἡροφίλου αἱρέσεως libro tertio decimo a Galeno adhibita." Ph.D. dissertation, Bonn, 1893. 29 p.

1332 Schönberger, P. Leander, O.S.B. *Studien zum 1. Buch der Harmonik des Claudius Ptolemäus*. Beilage zum Jahresbericht des humanistischen Gymnasiums Metten. Augsburg, 1914. x,133 p.

Schöne, Richard. See item 1058.

1333 *Schottländer, J[ohann] W[olfgang]. "Griechische Leiern." Ph.D. dissertation, Berlin, 1936.

1334 ———. "Über die Anwendung der Tonalitätskreistheorie auf die Musik der orientalischen Hochkulturen und der Antike." *Zeitschrift für vergleichende Musikwissenschaft* 3 (1935): 50–75.

1335 Schrade, Leo. "Music in the Philosophy of Boethius." *Musical Quarterly* 33 (1947): 188–200.

1336 Schrader, Hermann. "Heraclidea. Ein Beitrag zur Beurtheilung der schriftstellerischen Thätigkeit des (älteren) Pontikers Herakleides und des Herakleides Lembos." *Philologus* 44 (1885): 236.

1337 Schroeder, Otto. "Griechische Singverse." *Philologus* supp. 17/2 (1924): i–viii and 1–136.

1338 ———. "ΠΟΛΥΚΕΦΑΛΟΣ ΝΟΜΟΣ." *Hermes* 39 (1904): 315–20.

1339 ———. "Über altgriechische Volksliedstrophen." *Neue Jahrbücher* 13 (1910): 169–84.

1340 Schubart, Wilhelm. "Ein griechische Papyrus mit Noten." *Sitzungsbericht Berlin* 36 (1918): 763–68.

1341 Schueller, Herbert M. *The Idea of Music: An Introduction to Musical Aesthetics in Antiquity and the Middle Ages*. Early Drama, Art, and Music Monograph Series, vol. 9. Kalamazoo: Medieval Institute Publications, Western Michigan University, 1988. xiv,515 p.

1342 Schuhl, P. M. "Platon et la musique de son temps." *Revue internationale de philosophie* 32/2 (1955): 1–12.

Schullian, Dorothy M. See item 944.

Schulze, Werner. See item 709.

Schütz, Ch. Gf. See item 1060.

Schwartz, Rudolf. See item 5.

1343 Scott, William C. *Musical Design in Aeschylean Theater*. Hanover, N.H.: University Press of New England, 1984. xxi,228 p.

Scullard, H. H. See item 979.

1344 Séchan, Louis. *La danse grecque antique*. Paris: E. de Boccard, 1930. 369 p. + 19 plates.

1345 Sedgwick, W. B. "A Note on the Performance of Greek Vocal Music." *Classica et mediaevalia* 11 (1950): 222–26.

Segato, Paolo. See item 79.

Segonds, A. Ph. See item 1141.

1346 Seidenadel, Carl Wilhelm. "Greek Music from the Modern Point of View." *School Review* 6 (1898): 541–46.

1347 Sendrey, Alfred. *Music in the Social and Religious Life of Antiquity.* Rutherford, N. J.: Fairleigh Dickinson University Press, 1974. 489 p.

1348 Sextus Empiricus. "Sexti Empirici adversus musicos." In *Sexti Empirici viri longe doctissimi Adversus mathematicos,* trans. Gentianus Hervetus, 107–15. Antwerp: Plantin, 1569.

1349 ————. "Σέξτου Ἐμπειρικοῦ πρὸς μουσικούς." In *Sexti Empirici quae extant,* 127–38. Geneva: Pierre et Jacob Chouet, 1621.

1350 ————. "Σέξτου ἐμπειρικοῦ πρὸς μουσικούς." In *Sexti Empirici opera graece et latine,* graeca ex Mss. codicibus castigavit, versiones emendavit supplevitque et toti operi notas addidit Io. Albertus Fabricius, 2:238–61. Rev. ed. 2 vols. Leipzig: Kuehniana, 1841.

1351 ————. "Πρὸς μουσικούς." In *Sextus Empiricus,* ed. Immanuel Bekker, 748–61. Berlin: Reimer, 1842.

1352 ————. *Sextus Empiricus contre les musiciens (Livre VI du traité contre les savants).* Texte traduit en français pour la première fois avec commentaire perpétuel par Charles-Emile Ruelle. Collection des auteurs grecs relatifs à la musique, no. 6. Paris: Firmin-Didot, 1898. 21 p.
=*Revue des études grecques* 11 (1898): 138–58.

1353 ————. "Against the Musicians." In *Sextus Empiricus in Four Volumes,* trans. R. G. Bury, 4:372–405. 4 vols. Loeb Classical Library. Cambridge: Harvard University Press, 1933–49.

1354 ————. "Πρὸς μουσικούς." In *Sexti Empirici opera,* ed. Jürgen Mau, 3:163–75. 4 vols. Leipzig: B. G. Teubner, 1954–62.

1355 ————. *ΠΡΟΣ ΜΟΥΣΙΚΟΥΣ. Against the Musicians (Adversus musicos).* A new critical text and translation by Denise Davidson Greaves. Greek and Latin Music Theory, vol. 3. Lincoln: University of Nebraska Press, 1986. x,213 p.

————. See also items 788, 1230, and 1362.

1356 Seydel, Gerardus. "Symbolae ad doctrinae Graecorum harmonicae historiam." Ph.D. dissertation, Leipzig, 1907. 113 p.

1357 Shellens, Max Salomon. "Die Bedeutung der 'Katharsis' in der Musiklehre des Aristoteles." *Archiv für Philosophie* 7 (1957): 229–43.

1358 Shiloah, Amnon. *The Theory of Music in Arabic Writings (c. 900–1900).* RISM BX. Munich: G. Henle, 1979. xxviii,512 p.

1359 Shirlaw, Matthew. "Claudius Ptolemy as Musical Theorist." *Music Review* 16 (1955): 181–90.

1360 ————. "The Music and Tone Systems of Ancient Greece." *Music Review* 4 (1943): 14–27.

1361 ————. "The Music and Tone Systems of Ancient Greece." *Music Review* 32 (1951): 131–39.

1362 Shorey, Paul. "Notes on Sextus Empiricus Πρὸς μουσικούς 21." *Classical Philology* 11 (1916): 99.

———. See also item 1089.

Sikes, E. E. See item 20.

Simone, Antonio de. See item 1123.

1363 Six, J. "Het geluid van de Salpinx." In *Willem Mengelberg. Gedenkboek 1895–1920*, 139–41. 's-Gravenhage: Nijhoff, 1920.

1364 Skinner, Lucille. "Music in the Cultural Life of the Ancient Greeks and Its Historical Significance." M.A. thesis, College-Conservatory of Music of Cincinnati, 1937. 95 p.

Skjerne, Godtfred. See item 1100.

1365 Skulimowska, Zofia. "Instrumenty muzyczne na monetach greckiej wyspy Delos." *Muzyka* 14 (1969): 14–35.

Sluiter, Janus Otto. See item 72.

Smend, Friedrich. See item 675.

1366 Smith, Andrew. *Porphyry's Place in the Neoplatonic Tradition: A Study in Post-Plotinian Neoplatonism*. The Hague: Nijhoff, 1974. xviii,173 p.

1367 Smith, Henry Roy William. *Funerary Symbolism in Apulian Vase-Painting*. Ed. J. K. Anderson. University of California Publications, Classical Studies, vol. 12. Berkeley: University of California Press, 1976. x, 303 p. + 24 plates.

Smits, Joannes Pieter Hendrikus Maria. See item 1106.

Smyth, Herbert Weir. See item 16.

1368 Sneed, Adelaide Baker. "Musical Instruments from Earliest Records to the Year 1 A. D." M.A. thesis, Boston University, 1934. 70 p.

1369 Snell, Bruno. "Die Sprache Heraklits." *Hermes* 61 (1926): 353–81.

———. See also item 1082.

1370 Snyder, Jane McIntosh. "Aegisthos and the Barbitos." *American Journal of Archaeology* 80 (1976): 189–90.

1371 ———. "*Aulos* and *Kithara* on the Greek Stage." In *Panathenaia: Studies in Athenian Life and Thought in the Classical Age*, ed. T. Gregory and A. Podlecki, 75–95. Lawrence, Kansas: Coronado Press, 1979.

1372 ———. "The *Barbitos* in the Classical Period." *Classical Journal* 67 (1972): 331–40.

1373 ———. "The *Harmonia* of Bow and Lyre in Heraclitus Fr. 51 (DK)." *Phronesis* 29 (1984): 91–95.

1374 ———. "The Web of Song: Weaving Imagery in Homer and the Lyric Poets." *Classical Journal* 76 (1981): 193–96.

———. See also item 884.

1375 Söderberg, Bertil. "The Sistrum: A Musicological Study." *Ethnos* 33 (1968): 90–133.

Соколов, О. В. See item 536.

Solmsen, F. See item 644.

1376 Solomon, Jon. "Claudius Ptolemy: Harmonics." Unpublished typescript.

1377 ————. "The Diastaltic Ethos," *Classical Philology* 76 (1981): 93–100.

1378 ————. "A Diphonal Diphthong in the *Orestes* Papyrus." *American Journal of Philology* 97 (1976): 172–73.

1379 ————. "*Ekbole* and *Eklusis* in the Musical Treatise of Bacchius." *Symbolae Osloenses* 55 (1980): 111–26.

1380 ————. "The Manuscript Sources for the Aristides Quintilianus and Bryennius Interpolations in Cleonides' ΕΙΣΑΓΩΓΗ ΑΡΜΟΝΙΚΗ." *Rheinisches Museum für Philologie* 130 (1987): 360–66.

1381 ————. "The New Musical Fragment from Epidaurus." *Journal of Hellenic Studies* 105 (1985): 168–71.

1382 ————. "*Orestes* 344–45: Colometry and Music." *Greek, Roman, and Byzantine Studies* 18 (1977): 71–83.

1383 ————. "A Preliminary Analysis of the Organization of Ptolemy's *Harmonics*." In *Music Theory and Its Sources: Antiquity and the Middle Ages*, ed. André Barbera, 68–84. Notre Dame, Ind.: Notre Dame University Press, 1990.

1384 ————. "The Seikilos Inscription: A Theoretical Analysis." *American Journal of Philology* 107 (1986): 455–79.

1385 ————. "Towards a History of *Tonoi*." *Journal of Musicology* 3 (1984): 242–51.

1386 ————. "Vaticanus gr. 2338 and the Εἰσαγωγὴ ἁρμονική." *Philologus* 127 (1983): 247–53.

1387 ————. "Ven. Marc. gr. 322 and the MSS. of the Pseudo-Euclidean ΕΙΣΑΓΩΓΗ ΑΡΜΟΝΙΚΗ." *Classica et mediaevalia* 37 (1986): 137–44.

————. See also item 332.

Sophocles. See items 989, 1254, 1280, 1322, and 1589.

1388 Sörbom, Göran. "Hibeh-papyrus om musik." *Svensk tidskrift för musikforskning* 64 (1982): 59–60.

1389 Southgate, T. Lea. "Ancient Flutes from Egypt." *Journal of Hellenic Studies* 35 (1915): 12–21.

1390 Spiegel, Walter. "Die Bedeutung der Musik für die griechische Erziehung im klassischen Alterthum." Ph.D. dissertation, Erlangen, 1910. 92 p.

1391 Spiro, Friedrich. "Σύμπτυκτοι ἀναπαίστοι." *Hermes* 23 (1888): 607–12.
See also items 373 and 1545.

————. See also item 1043.

1392 Spitta, Philipp. "Eine neugefundene altgriechische Melodie." *Vierteljahrsschrift für Musikwissenschaft* 10 (1894): 103–10.

Stahl, William Harris. See items 901 and 915.

1393 Stamm, Adolf, ed. *Tres canones harmonici*. Berlin: Weidmann, 1881. 30 p.
Also included in item 1402, pp. 1–30.

1394 Stanford, W. B. *The Sound of Greek: Studies in the Greek Theory and Practice of Euphony.* Sather Classical Lectures, vol. 38. Berkeley: University of California Press, 1967. viii,177 p. + recording.

1395 Stanley, Albert. *Greek Themes in Modern Musical Setting.* University of Michigan Studies, Humanistic Series, vol. 15. New York: Macmillan, 1924. xxii,385 p.

1396 Steinmayer, Otto. "A Glossary of Terms Referring to Music in Greek Literature before 400 B.C." Ph.D. dissertation, Yale, 1986. 242 p.

————. See also item 111.

Stéphanou, E. See item 1417.

1397 Stevens, John. *Words and Music in the Middle Ages: Song, Narrative, Dance and Drama, 1050–1350.* Cambridge Studies in Music. Cambridge: Cambridge University Press, 1986. xviii,554 p.

1398 Stieglitz, Robert R. "Minoan Mathematics or Music?" *Bulletin of the American Society of Papyrologists* 15 (1978): 127–32.

Stokes, Richard. See item 359.

1399 Stone, Yona. "Music and History in Ancient Greece." M.M. thesis, College-Conservatory of Music of Cincinnati, 1951. i,34 p.

1400 Strabo. *Geographica.* 3 vols. in 2. Ed. A. Meineke. Leipzig: B. G. Teubner, 1877; reprint, Graz: Akademische Druck- und Verlagsanstalt, 1969. xv,814 + vii,424 [i.e., 815–1238] p.

Strainchamps, Edmond. See item 898.

1401 Strunk, Oliver. "Intonations and Signatures of the Byzantine Modes." In *Essays on Music in the Byzantine World,* 19–36. New York: Norton, 1977.

————. See also items 294, 334, 524, 705, and 939.

1402 Studemund, Guilelmus. *Anecdota varia graeca musica metrica grammatica.* Berlin: Weidmann, 1886.

Anecdota musica, pp. 1–30. Cf. item 1393.

————. See also items 31 and 1513.

1403 Stumpf, Carl. *Geschichte des Konsonanzbegriffes. 1. Die Definition der Konsonanz im Altertum.* Abhandlungen der philosophisch-philologischen Classe der königlichen bayerischen Akademie der Wissenschaften, vol. 21/1. München: Franz, 1897. 78 p.

1404 ————. *Die pseudoaristotelischen Probleme über Musik.* Abhandlungen der Akademie der Wissenschaften zu Berlin, philologisch-historische Klasse, vol. 3. Berlin: Reimer, 1897. 85 p.

1405 Styles, Francis Haskins Eyles. "An Explanation of the Harmonic Doctrine of Ptolemy." *Philosophical Transactions* 51, pt. 2, art. 68 (1760): 695–773.

1406 Sudhaus, Siegfried. *Prolegomena ad Philodemi Rhetorica.* Leipzig: B. G. Teubner, 1892. 39 p.

=Ph.D. dissertation, Bonn.

1407 Sultan, Nancy. "New Light on the Function of Borrowed Notes in Ancient Greek Music: A Look at Islamic Parallels." *Journal of Musicology* 6 (1988): 387–98.

1408 Susemihl, Franz. *De fontibus rhythmicae Aristidis Quintiliani doctrinae commentatio*. Index Scholarum in Universitate Litteraria Gryphiswaldensi per semestre hibernum, 1866–1867. Gryphiswaldiae, typis F. G. Kunike, 1866. 16 p.

1409 ————. "Zur griechischen Rhythmik." *Jahbücher für Philologie und Pädagogik* 101 (1870): 510–13.

1410 Süss, W. "Über den Chiron des Pherecrates." *Rheinisches Museum* 110 (1967): 26–31.

1411 Sylburg, Friedrich, ed. *Etymologicon magnum seu Magnum grammaticae penu*. Editio nova correctior. Leipzig: Weigel, 1816. xv,1091 p.

1412 Tanner, Robert. "La musique antique grecque." *Revue musicale* 248 (1961): 5–72.

1413 Tannery, Paul. "À propos des fragments philolaiques sur la musique." *Revue de philologie* 28 (1904): 233–49.

1414 ————. "Du rôle de la musique grecque dans le développement de la mathématique pure." *Bibliotheca mathematica* III/3 (1902): 161–75.

1415 ————. "L'Évolution des gammes antiques." *Mémoires scientifiques* III/3 (1913): 312–20.

1416 ————. "Inauthenticité de la «Division du canon» attribuée à Euclide." *Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres* 4 (1904): 439–45.

1417 ————. *Quadrivium de Georges Pachymère ou Σύνταγμα τῶν τεσσάρων μαθημάτων ἀριθμητικῆς, μουσικῆς, γεωμετρίας καὶ ἀστρονομίας*. Texte revisé et établi par le R. P. E. Stéphanou A. A. Studi e testi, vol. 94. Vatican City: Biblioteca Apostolica Vaticana, 1940. cii,459 p.

1418 ————. "Sur les intervalles de la musique grecque." *Revue des études grecques* 15 (1902): 336–52.

1419 ————. "Sur le spondiasme dans l'ancienne musique grecque." *Revue archéologique* IV/17 (1911): 41–50.

1420 ————. "Sur Théon de Smyrne." *Revue de philologie* 18 (1894): 145–52; 19 (1895): 67–69.

1421 ————. "Sur un point d'histoire de la musique grecque." *Revue archéologique* 39 (1902): 49–54.

1422 Theiler, Willy. *Porphyrios und Augustin*. Schriften der Königsberger Gelehrten Gesellschaft, geisteswissenschaftliche Klasse, vol. 10/1. Halle: M. Niemeyer, 1933. 74 p.

1423 Themelis, Dimitris. "Eine antike Musikinschrift aus dem Heiligtum des Herakles Pankrates." *Die Musikforschung* 47 (1994): 349–64.

1424 ————. "Zwei neue Funde altgriechischer Musik aus Laureotike und aus Pelion." *Die Musikforschung* 42 (1989): 307–25.

1425 Theon of Smyrna. *ΘΕΩΝΟΣ ΣΜΥΡΝΑΙΟΥ ΠΛΑΤΩΝΙΚΟΥ, τῶν κατὰ μαθηματικὴν χρησίμων εἰς τὴν τοῦ ΠΛΑΤΩΝΟΣ ἀνάγνωσιν. Theonis Smyrnaei Platonici, eorum, quae in mathematicis ad Platonis lectionem utilia sunt, expositio.* Opus nunc primum editum, Latina versione, ac notis illustratum ab Ismaele Bullialdo Iuliodunensi. Lutetiae Parisiorum, apud Ludovicum de Heuqueville, cum privilegio Regis, 1644. 308 p.

1426 ————. *ΘΕΩΝΟΣ Σμυρμαίου Πλατωνικοῦ περὶ τῶν κατὰ ἀριθμητικὴν χρησίμων εἰς τὴν τοῦ Πλάτωνος ἀνάγνωσιν.* Bullialdi interpretationem latinam, lectionis diversitatem suamque annotationem addidit J. J. de Gelder. Lugduni-Batavorum, apud S. et J. Luchtmans, 1827. lxxii,195 p.

1427 ————. *Theonis Smyrnaei philosophi Platonici. Expositio rerum mathematicarum ad legendum Platonem utilium.* Rec. Eduardus Hiller. Leipzig: B. G. Teubner, 1878; reprint in Greek and Roman Philosophy, vol. 42, New York: Garland, 1987. viii,216 p.

1428 ————. *Θέωνος σμυρμαίου Πλατωνικοῦ τῶν κατὰ τὸ μαθηματικὸν χρησίμων εἰς τὴν Πλάτωνος ἀνάγνωσιν. Théon de Smyrne philosophe platonicien exposition des connaissances mathématiques utiles pour la lecture de Platon.* Traduits pour la première fois du grec en français par Jean Dupuis. Paris: Hachette, 1892; reprint, Bruxelles: Culture et Civilisation, 1966. xxvii,403 p.

1429 ————. *ΘΕΩΝΟΣ ΣΜΥΡΝΑΙΟΥ, Mathematics Useful for Understanding Plato.* Translated from the 1892 Greek/French Edition of J. Dupuis by Robert and Deborah Lawlor, edited and annotated by Christos Toulis and others. Secret Doctrine Reference Series. San Diego, California: Wizards Bookshelf, 1979. xvi,174 p.

————. See also items 820 and 1420.

1430 Theophrastus. *Enquiry into Plants and Minor Works on Odours and Weather Signs.* 2 vols. Trans. Arthur Hort. Loeb Classical Library. London: William Heinemann, 1916. xxviii,475 + ix,499 p.

————. See also items 140, 145, and 1173.

1431 Θερειάνος, Εὐστάθιος. *Περὶ μουσικῆς τῶν Ἑλλήνων καὶ ἰδίως τῆς ἐκκλησιαστικῆς.* Ἐν Τεργέστῃ, τύποις τοῦ Αὐστροουγγρικοῦ Λόϋδ, 1875. 57 p.

1432 Thiemer, Hannelore. *Der Einfluss der Phryger auf die altgriechische Musik.* Orpheus: Schriftenreihe zu Grundfragen der Musik, vol. 29. Bonn-Bad Godesberg: Verlag für systematische Musikwissenschaft, 1979. 160 p.

1433 Thierfelder, Albert. "Altgriechische Musik." *Sammelbände der Internationalen Musikgesellschaft* 7 (1905–6): 485–507.

1434 ————. "Ein neuaufgefundener Papyrus mit griechischen Noten." *Zeitschrift für Musikwissenschaft* 1 (1918–19): 217–25.

1435 ————. "Die pythagoräische Terz." *Zeitschrift für Musikwissenschaft* 2 (1919–20): 193–94.

1436 ———. "System der altgriechische Instrumentalnotenschrift." *Philologus* 56 (1897): 492–524.

1437 Thiersch, Hermann. "Antike Bauten für Musik." *Zeitschrift für Geschichte der Architektur* 2 (1908–9): 67–95.

1438 Thimus, Albert von. *Die harmonikale Symbolik des Altertums.* 2 vols. Köln: Du Mont-Schauberg, 1868–76. xxx,820 p.

Reprint, together with the work of Hasenclever, Hildesheim: G. Olms, 1970. See also items 616 and 1524.

1439 Thompson, Glenda G. "A Dialogue Concerning the Music of Ancient Greece." *Classical Outlook* 57, no. 1 (1979): 1–4.

Thomson, George. See item 257.

1440 Thorp, John. "Aristoxenus and the Ethnoethical Modes." In *Harmonia mundi: Musica e filosofia nell'antichità: Music and Philosophy in the Ancient World,* ed. Robert W. Wallace and Bonnie MacLachlan, 54–68. Biblioteca di Quaderni urbinati di cultura classica, vol. 5. Roma: Edizioni dell'Ateneo, 1991.

1441 Thurot, Charles. "De l'emploi des mots θέσει, positione en prosodie." *Revue de philologie* 4 (1880): 92–97.

1442 Tiby, Ottavio. "Ancora sul nomos policefalo." *Dioniso* 8 (1940): 106–7.

See item 1444.

1443 ———. *La musica in Grecia e a Roma.* Firenze: Sansoni, 1942. vi,201 p.

1444 ———. "Il nomos policefalo." *Dioniso* 6 (1938): 343–47.

See item 1442.

1445 ———. "Note musicologiche al Timeo di Platone." *Dioniso* 12 (1949): 33–55.

1446 *Tiersot, Julien. "Musique antique, les nouvelles découvertes de Delphes." *Le Ménestrel* (1896).

1446a Tintori, Giampiero. *La musica di Roma antica.* Lucca: Akademos & Lim, 1996. 224 p.

1447 Tischer, Gerhard. "Die aristotelischen Musikprobleme." Ph.D. dissertation, Berlin, 1902. 34 p.

Томасов, Н. Н. See item 1101.

1448 Tomlinson, Gary. *Music in Renaissance Magic: Toward a Historiography of Others.* Chicago: University of Chicago Press, 1993. xvi,291 p.

1449 Töpfer, K. "Die musikalische Katharsis des Aristoteles." *Zeitschrift für die Österreichischen Gymnasien* 62 (1911): 961–79.

1450 Torr, Cecil. "Greek Music." In *The Oxford History of Music, Introductory Volume,* ed. Percy C. Buck, 1–32. London: Oxford University Press, 1929.

1451 ———. *On the Interpretation of Greek Music.* London: H. Frowde, 1896. 26 p.

1452 ———. "The Music of the *Orestes.*" *Classical Review* 8 (1894): 397–98.

1453 Touliatos, Diane. "Nonsense Syllables in the Music of the Ancient Greek and Byzantine Traditions." *Journal of Musicology* 7 (1989): 231–43.

Toulis, Christos. See item 1429.

1454 Tournier, Edouard. "Sur Aristoxène, Éléments harmoniques, p. 9 Meyb." *Revue de philologie* 2 (1878): 194.

1455 Trendall, A. D.; and A. Cambitoglou. *The Red-Figured Vases of Apulia.* 2 vols. Oxford Monographs on Classical Archaeology. Oxford: Clarendon, 1978. liv,442 + xlvi,632 [i.e., 443–1074] + 400 plates.

1456 Trinkler, Friedrich Theodor. *Die Lehren von der Harmonik und Melopöie der griechischen Musik in ihrem Grundzügen dargestellt.* Posen: Königl. Hofbuchdruckerei, W. Decker, 1842. 61 p.

1457 Tsugami, Eisuke. "Aristides Quintilianus no ongaku-ron." *Kenkyu* 3 (1985): 121–44.

1458 ———. "Ptolemaios no tonos ethos ron." *Bigaku* 135 (1983): 32–41.

1459 ———. "Uchû no chôwa—Ptolemaios *Harmonika* III/8–16 no kaishaku." 2 vols. M.A. dissertation, Tokyo University, 1982. 346 p.

———. See also item 942.

1460 Turchetto, Gerald M. "Plato's Musical Imagination." Ph.D. dissertation, SUNY Stony Brook, 1982. 288 p.

1461 Turner, E. G. "Two Unrecognized Ptolemaic Papyri." *Journal of Hellenic Studies* 76 (1956): 95–98.

1462 Turner, E. G., and Reginald P. Winnington-Ingram. "2436. Monody with Musical Notation." *Oxyrhynchus Papyri* 25 (1959): 113–22 and plate 14.

1463 Turner, R. L. "A Note on the Word Accent in Greek Music." *Classical Review* 29 (1915): 195–96.

1464 Turrell, Frances Berry. "Modulation: An Outline of Its Prehistory from Aristoxenus to Henry Glarean." Ph.D. dissertation, University of Southern California, 1956. iii,602 p.

1465 Tzetzes, Johannes. *Über die altgriechische Musik in der griechischen Kirche.* München: Dr. C. Wolf & Sohn, 1874; reprint, Wiesbaden: Sändig, 1973. 107 p.

1466 Untersteiner, Alfred. *Storia della musica.* 2d ed., rev. Milano: Hoepli, 1902. 329 p.

Unverricht, Hubert. See item 855.

1467 Urbain, Georges. *Le tombeau d'Aristoxène, essai sur la musique.* Paris: G. Doin, 1924. xvi,234,iv p.

1468 Ursprung, Otto. "Alte griechische Einflüsse und neuer gräzistischer Einschlag in der mittelalterlichen Musik." *Zeitschrift für Musikwissenschaft* 12 (1929–30): 193–219.

1469 ———. "Die antiken Transpositionsskalen und die Kirchentöne." *Archiv für Musikforschung* 5 (1940): 129–52.

1470 ————. "Der Hymnus aus Oxyrhynchos: Das älteste Denkmal christlicher-Musik." *Bulletin de la société-union musicologique* (1923): 105–32.

1471 Usener, Hermann. *Altgriechischer Versbau. Ein Versuch vergleichender Metrik.* Bonn: M. Cohen und Sohn, 1887. 127 p.

1472 Ussing, Johan Louis. *Graesk og romersk metrik.* Kjøbenhavn: Forlagt af den Gyldendalske Boghandel, 1893. 207 p.

Valgulio, Carlo. See items 1028 and 1091–92.

Valk, Marchinus van der. See item 480.

1473 Valla, Giorgio. "De musica libri V, sed primo de inventione et commoditate eius." In *De expetendis et fugiendis rebus opus,* ff. e[vi]–m[viii]. Venetiis, in aedibus Aldi Romani impensa, ac studio Ioannis Petri Vallae filii pientiss., mense Decembri, 1501.

————. See also items 327 and 931.

1474 Vanek, Ferd. "Byla řecká hudba vícehlasa? Přípěvek k řešení staré otázky." In *Sborník prací filologických dvornímu radovi professoru Josefu Královi k šedesátým narozeninám,* 215–24. V. Praze: B. Stýlbo, 1913.

Varcl, L. See item 257.

Velimirović, Miloš. See item 1217.

1475 Veneri, Alina. "La cetra di Paride: L'altra faccia della musica in Omero e nei suoi interpreti antichi." In *Mousike: Metrica, ritmica e musica greca in memoria di Giovanni Comotti,* ed. Bruno Gentili and Franca Perusino, 111–32. Pisa: Istituti editoriali e poligrafici internazionali, 1995.

Verchi, Gemma. See item 1123.

1476 Vetter, Max[imilian] Hermann. "Additamenta ad H. Stephani thes. ex musicis gr. excerpta." *Programm-Zwickau* (1867): 1–26.

1477 ————. "Specimen lexici in musicos graecos." In *Memoriam anniversarium dedicatae ante hos CCCXVIII annos scholae regiae afranae ...,* 1–34. Misenae, ex officina C. E. Klinkichtii, 1861.

1478 Vetter, Walther. *Antike Musik.* München: E. Heimeran, 1935. 39 p.

1479 ————. "Antike Musik aus unserer Sicht." *Musica* 12 (1958): 582–86.

1480 ————. "Die antike Musik in der Beleuchtung durch Aristoteles." *Archiv für Musikforschung* 1 (1936): 2–41.

1481 ————. "Antike Polyphonie?" In *Bericht über den siebenten internationalen musikwissenschaftlichen Kongress Köln 1958,* hrsg. G. Abraham, 290–93. Kassel: Bärenreiter, 1959.

1482 ————. "Zur Erforschung der antiken Musik." In *Festschrift Max Schneider zum 60. Geburtstag überreicht von Kollegen, Freunden und Schülern,* hrsg. H. J. Zingel, 137–46. Halle, Eisleben-Lutherstadt: E. Schneider, 1935.

1483 ————. "Ethos." *Die Musik in Geschichte und Gegenwart* 3 (1954): 1581–91.

1484 ————. "Griechenland, antike." *Die Musik in Geschichte und Gegenwart* 5 (1956): 839–65.

1485 ————. "Mesomedes." *Real-Enzyklopädie der klassischen Altertumswissenschaft* 29 (1901): 1103.

1486 ————. "Metabole." *Real-Enzyklopädie der klassischen Altertumswissenschaft* 30 (1901): 1313–16.

1487 ————. "Monaulos." *Real-Enzyklopädie der klassischen Altertumswissenschaft* 31 (1933): 74–75.

1488 ————. "Musik." *Real-Enzyklopädie der klassischen Altertumswissenschaft* 31 (1933): 823–76.

1489 ————. "Die Musik im Erziehungsplane der griechischen Antike." *Deutsche Musikkultur* 7 (1942): 33–42.

1490 ————. "Die Musik im platonischen Staate." *Neue Jahrbücher* 11 (1935): 306–20.

1491 ————. "Musikalische Sinndeutung des antiken Nomos." *Zeitschrift für Musikwissenschaft* 17 (1935): 289–304.

1492 ————. "Musikunterricht." *Real-Enzyklopädie der klassischen Altertumswissenschaft* 31 (1933): 877–84.

1493 ————. *Mythos-Melos-Musica II.* Leipzig: VEB Deutscher Verlag für Musik, 1961. 527 p.

Contains reprints of many of Vetter's articles.

1494 ————. "Nomos." *Real-Enzyklopädie der klassischen Altertumswissenschaft* 33 (1936): 840–43.

————. See also items 161, 651, 738, and 1542.

1495 Vincent, Alexandre Joseph Hydolphe. *De la musique des anciens Grecs: Discours prononcé au congrès scientifique de France dans la séance générale du 30 Août 1853.* Arras: d'A. Brissy, 1854. 11 p.

1496 ————. *Notice sur trois manuscrits grecs relatifs à la musique, avec une traduction française et des commentaires.* Notices et extraits des manuscrits de la Bibliothèque du Roi et autres bibliothèques, vol. 16. Paris: Imprimerie Royale, 1847. 600 p.

1497 ————. *Quelques mots sur la musique et la poésie ancienne, à propos de l'ouvrage de m. B. Jullien, intitulé De quelques points des sciences dans l'antiquité.* Paris: C. Dounial, 1854. 48 p.

See item 751.

1498 ————. *Réponse à M. Fétis et réfutation de son mémoire sur cette question: les Grecs et les Romains ont-ils connu l'harmonie simultanée des sons? En ont-ils fait usage dans leur musique?* Lille: L. Danel, 1859. 80 p.

See item 493.

————. See also item 420.

1499 Vincent, A. J. H., and T. Henri Martin. *Passage du traité de la musique d'Aristide Quintilien relatif au nombre nuptial de Platon. Traduit et annoté. Suivi de deux notes de Th. Henri Martin, l'une sur l'époque de Aristide Quintilien et sur celle de l'astronome*

Claude Ptolémée. Rome: Impr. des sciences mathématiques et physiques, 1865. 14 p.

1500 Vitruvius. *On Architecture*. 2 vols. Ed. and trans. Frank Granger. Loeb Classical Library. Cambridge: Harvard University Press, 1931–34. xxxvi,322,plates A–H + xlvi,384,plates I–T.

———. See also item 327.

1501 Vogel, Martin. "Anregendes Griechentum." *Die Musikforschung* 15 (1962): 1–11.

1502 ———. *Chiron der Kentaur mit der Kithara*. Orpheus: Schriftenreihe zu Grundfragen der Musik, vols. 25–26. Bonn-Bad Godesberg: Verlag für systematische Musikwissenschaft, 1978. 764 p.

1503 ———. "Die drei Tongeschlechter des Archytas." In *Bericht über den internationalen musikwissenschaftlichen Kongress Hamburg 1956*, 233–35. Kassel: Bärenreiter, 1957.

1504 ———. *Die Enharmonik der Griechen*. 2 vols. Orpheus: Schriftenreihe zu Grundfragen der Musik, vols. 3–4. Düsseldorf: Verlag der Gesellschaft zur Förderung der systematischen Musikwissenschaft, 1963. 153 + 189 p.

Review by Reginald P. Winnington-Ingram in *Die Musikforschung* 18 (1965): 60–64.

1505 ———. "Harmonikale Deutung eines pythagoreischen Spruches." In *Festschrift Joseph Schmidt-Görg zum 60. Geburtstag; Gemeinsam mit seinen Kollegen, Schülern und Freunden im Auftrag des Beethovenhauses*, hrsg. Dagmar Weise, 377–82. Bonn: Beethovenhaus, 1957.

1506 ———. *Onos Lyras. Der Esel mit der Leier*. 2 vols. Orpheus: Schriftenreihe zu Grundfragen der Musik, vols. 13–14. Düsseldorf: Verlag der Gesellschaft zur Förderung der systematischen Musikwissenschaft, 1973. 739 p.

1507 ———. "Der Schlauch des Marsyas." *Rheinisches Museum* 107 (1964): 34–56.

1508 ———. "Die Zahl Sieben in der spekulativen Musiktheorie." Ph.D. dissertation, Bonn, 1954. 339 p.

1509 Volbach, Fr. "Die Cheironomie im alten Ägypten." *Orientalistische Litteraturzeitung* 23 (1920): 1–8.

Volkmann, Richard. See item 1096.

1510 Vollgraff, Guilielmus. "De lege collegii cantorum Milesii." *Mnemosyne* n. s. 46 (1918): 415–27.

———. See also item 56.

1511 Volpert, Andreas. "Der kultische Tanz in der Antike." *Zeitschrift für geistliche Musik* 10 (1933): 5–7.

1512 Voltz, Ludwig. "Die εἴδη des daktylischen Hexameters. Ein Beitrag zur Geschichte der griechischen Metrik." *Philologus* 52 (1894): 385–94.

1513 ————. "Die Tractate περὶ παθῶν τοῦ ἡρωικοῦ ἀέτρου." In *Commentationes in honorem G. Studemund*, 77–89. Strassburg: Heitz, 1889.

1514 Vorreiter, Leopold. "Antike Phoinix-Lyren." *Archiv für Musikorganologie* 3–4 (1979): 61–67.

1515 ————. "Apollon-, Orpheus-, und Thamyris-Lyren." *Archiv für Musikorganologie* 2 (1977): 113–33.

1516 ————. "Archaisch-antike Lyrenbaukunst: Eine polyvalente Hochkunst." *Archiv für Musikorganologie* 3–4 (1979): 14–30.

1517 ————. "Die Kunst des Musikinstrumentenbaues in der Einheit der Künste des Altertums." *Archiv für Musikorganologie* 2 (1977): 3–34.

1518 ————. "Lyren der Illyrioi." *Archiv für Musikorganologie* 2 (1977): 68–94.

1519 ————. "Riesenlyren des Altertums." *Archiv für Musikorganologie* 3–4 (1979): 30–37.

1520 ————. "Thrakien als Musikland." *Archiv für Musikorganologie* 3–4 (1979): 68–83.

1521 Voss, Otto. *De Heraclidis Pontici vita et scriptis*. Leipzig: Fock, 1896. 95 p. =Ph.D. dissertation, Rostoch.

Vox, O. See item 42.

Wade, Bonnie. See item 931.

1522 Waerden, Bartel Leendert van der. "Die Harmonielehre der Pythagoreer." *Hermes* 78 (1943): 163–99.

1523 Wagener, A. *Mémoire sur la symphonie des anciens*. N.p., n.d. [Bruxelles?, 1863?] 82 p.

Wagner, Cosima. See item 577.

1524 Wagner, Rüdiger. "Albert von Thimus: *Die harmonikale Symbolik des Altertums*. Ein seit 100 Jahren vergessenes Werk." *Zeitschrift für Ethnologie* 96 (1971): 90–97.
See items 616 and 1438.

1525 Wagner, Rudolf. "Der Berliner Notenpapyrus." *Philologus* 77 (1921): 3–4 and 256–310.

1526 ————. "Der Oxyrhynchos-Notenpapyrus." *Philologus* 79 (1923): 201–21.

1527 ————. "Zum Wiederaufleben der antiken Musikschriftsteller seit dem 16. Jahrhundert, ein Beitrag zur Frage Kircher oder Pindar." *Philologus* 91 (1936): 161–73.

1528 Walcker-Mayer, Werner. *Die römische Orgel von Aquincum*. Ludwigsburg: Musikwissenschaftliche Verlag, 1970. 118 p.

1529 Walker, R. J. "A Fragment of Greek Music." *Oxford and Cambridge Review* 15 (1911): 113–19.

1530 Wallace, Robert W. "Damone de Oa ed i suoi successori: Un'analisi delle fonti." In *Harmonia mundi: Musica e filosofia nell'antichità: Music and Philosophy in the Ancient World*, ed. Robert W.

Wallace and Bonnie MacLachlan, 30–53. Biblioteca di Quaderni urbinati di cultura classica, vol. 5. Roma: Edizioni dell'Ateneo, 1991.

1531 ————. "Music Theorists in Fourth-Century Athens." In *Mousike: Metrica, ritmica e musica greca in memoria di Giovanni Comotti*, ed. Bruno Gentili and Franca Perusino, 17–39. Pisa: Istituti editoriali e poligrafici internazionali, 1995.

1532 ————. "Musica e filosofia nell'antichità." In *Harmonia mundi: Musica e filosofia nell'antichità: Music and Philosophy in the Ancient World*, ed. Robert W. Wallace and Bonnie MacLachlan, 1–6. Biblioteca di Quaderni urbinati di cultura classica, vol. 5. Roma: Edizioni dell'Ateneo, 1991.

1533 Wallace, Robert W., and Bonnie MacLachlan, eds. *Harmonia mundi: Musica e filosofia nell'antichità: Music and Philosophy in the Ancient World*. Biblioteca di Quaderni urbinati di cultura classica, vol. 5. Roma: Edizioni dell'Ateneo, 1991. viii,153 p.

————. See also items 17, 143, 355, 899, 1236, 1440, 1530, and 1532.

1534 Wallis, Johannes. "De veterum harmonica ad hodiernam comparata." In *Operum mathematicorum*, 3:153–82. Oxoniae, e Theatro Sheldoniano, 1699.

————. See also items 259, 1124, 1146–47, and 1266.

1535 Walter, Anton Friedrich. "Die ethisch-pädagogische Würdigung der Musik durch Plato und Aristoteles." *Vierteljahrsschrift für Musikwissenschaft* 6 (1890): 388–415.

1536 Wantzloeben, Sigfried. *Das monochord als Instrument und als System, entwicklungsgeschichtlich dargestellt*. Halle: M. Niemeyer, 1911. iii,131 p.
=Ph.D. dissertation, Halle.

Waszink, J. H. See item 364.

1537 Waterfield, Robin, trans. *The Theology of Arithmetic: On the Mystical, Mathematical and Cosmological Symbolism of the First Ten Numbers*. Foreword by Keith Critchlow. Grand Rapids, MI: Phanes Press, 1988.

1538 Weber, Max. *The Rational and Social Foundations of Music*. Ed. and trans. Don Martindale, Johannes Riedel, and Gertrude Neuwirth. Carbondale: Southern Illinois University Press, 1958. lii,148 p.

1539 Webster, T. B. L. *The Greek Chorus*. London: Methuen, 1970. xiv,223 p.

————. See also item 1071.

Wedeck, Harry E. See item 365.

Wegener, Heinz. See items 161, 651, 738, and 1542.

1540 Wegner, Max. *Musik und Tanz*. Archäologia Homerica, vol. 3/U. Göttingen: Vandenhoeck & Ruprecht, 1968. 85 p.

1541 ————. *Griechenland*. Musikgeschichte in Bildern, II/4. Leipzig: VEB Deutscher Verlag für Musik, n.d. 144 p.

1542 ————. "Kalliope." In *Musa-Mens-Musici. Im Gedenken an Walther Vetter*, hrsg. Heinz Wegener, 17–27. Leipzig: VEB Deutscher Verlag für Musik, 1969.

1543 ————. *Die Musikinstrumente des alten Orients*. Orbis antiquus, vol. 2. Münster: Aschendorff, 1950. 89 p.

1544 ————. *Das Musikleben der Griechen*. Berlin: W. de Gruyter, 1949. 232 p. + 32 plates.

Wehrli, Fritz. See items 86 and 639.

1545 Weil, Henri. "Σύμπτυκτοι ἀνάπαιστοι." *Revue de philologie* 13 (1889): 44–46.

See also items 373 and 1391.

————. See also item 1099 and 1570.

Weise, Dagmar. See item 1505.

1546 Weitzmann, C. F. *Geschichte der griechischen Musik*. Berlin: Hermann Peters, 1855; reprint, Wiesbaden: Sändig, 1973. 36 p. + 12 pp. of examples.

1547 Wellesz, Egon. "The Earliest Example of Christian Hymnody." *Classical Quarterly* 39 (1945): 34–45.

1548 ————. *A History of Byzantine Music and Hymnography*. 2d ed., rev. Oxford: Clarendon, 1961. xiv,461 p. + 7 plates.

Chapters 2–4 include copious material on ancient Greek music and music theory.

————. See also items 115, 486–87, 635, 1075, and 1328.

Welskopf, Elisabeth Charlotte. See item 1220.

1549 Werner, Eric. "Greek Ideas on Music in Judeo-Arabic Literature." In *The Commonwelath of Music, in Honor of Curt Sachs*, ed. Gustave Reese and Rose Brandel, 71–96. Glencoe: The Free Press, 1964.

1550 ————. "Pseudo-Plutarch's Views on the Theory of Rhythm." *Orbis musicae* 7 (1979–80): 27–36.

1551 Wessely, Carl. "Einige Urkunden der Berliner kgl. ägypt. Museums—Antike Reste griechischer Musik." *Programm des Gymnasiums im 3. Bezirke Wien* (1891): 1–26.

1552 ————. "Le papyrus musical d'Euripide." *Revue des études grecques* 5 (1892): 265–80.

1553 ————. "Papyrusfragment des Chorgesanges von Euripides *Orest* 330ff mit Partitur." *Mitteilungen aus der Sammlung des Papyrus Erzherzog Rainer* 5 (1892): 65–73.

1554 West, Martin L. "An Alleged Musical Inscription." *Zeitschrift für Papyrologie und Epigraphik* 93 (1992): 27–28.

1555 ————. "Analecta musica." *Zeitschrift für Papyrologie und Epigraphik* 92 (1992): 1–54.

1556 ————. *Ancient Greek Music*. Oxford: Clarendon, 1992. xiii,410 + 35 plates.

1557 ————. "Music in Archaic Greece." In *Actes di VIIe Congrès de la Fédération internationale des associations d'études classiques*, ed. János Harmatta, 1:213–20. Budapest: Akadémiai Kiado, 1984.

1558 ————. "The Singing of Hexameters: Evidence from Epidaurus." *Zeitschrift für Papyrologie und Epigraphik* 63 (1986): 39–46.

1559 ————. "The Singing of Homer and the Modes of Early Greek Music." *Journal of Hellenic Studies* 101 (1981): 113–29.

1560 ————. "Two Notes on Delphic Inscriptions." *Zeitschrift für Papyrologie und Epigraphik* 2 (1968): 176.

1561 Westphal, Rudolf. *Allgemeine griechische Metrik*. Leipzig: B. G. Teubner, 1865. xxxiv,576 p.

1562 ————. *Allgemeine Metrik der indogermanischen und semitischen Völker auf Grundlage der vergleichenden Sprachwissenschaft. Mit eine Exkurse "Der griechische Hexameter in der deutscher Nachbildung von Heinrich Kruse."* Berlin: Calvary & Co., 1892. xvi,514 p.

1563 ————. "Die aristoxenische Rhythmuslehre." *Vierteljahrsschrift für Musikwissenschaft* 7 (1891): 74–107.

1564 ————. *Die Fragmente und die Lehrsätze der griechischen Rhythmiker*. Leipzig: B. G. Teubner, 1861. xv,262 p.

1565 ————. *Griechische Rhythmik und Harmonik nebst der Geschichte der drei musischen Disziplinen*. Leipzig: B. G. Teubner, 1867. xxx,809 p.

1566 ————. *Harmonik und Melopöie der Griechen*. Leipzig: B. G. Teubner, 1863. lvi,372 p.

1567 ————. "Mehrstimmigkeit oder Einstimmigkeit der griechischen Musik." *Berliner philologische Wochenschrift* 4 (1884): 1–6, 33–36, 65–68, and 97–103.

1568 ————. *Die Musik des griechischen Alterthumes. Nach den alten Quellen neu bearbeitet*. Leipzig: Veit, 1883. vi,354 p.

1569 ————. "Platos Beziehungen zur Musik." *Berliner philologische Wochenschrift* 4 (1884): 513–18, 545–49, 609–11, 641–45, and 673–77.

1570 ————. *System der antiken Rhythmik*. Breslau: F. E. C. Leuckart, 1865. xii,195 p.

Reviewed by Henri Weil in *Jahrbücher für classische Philologie* 11 (1865): 649–56.

————. See also items 65, 78, 85, 658, 729, 1097, and 1251.

Wicke, Peter. See item 905.

1571 Widor, Charles-Marie. "La musique grecque et les chants de l'église latine." *Revue des deux mondes* IV/131 (1895): 694–706.

1572 Wiegandt, Hermann. "De ethico antiquorum rhythmorum charactere auctore Aristide Quintiliano." Ph.D. dissertation, Halle, 1881. 30 p.

1573 Wiemken, Helmut. "Der griechische Mimus. Aufführungs-Praxis der griechischen Mimen in der Kaiserzeit." Ph.D. dissertation, Göttingen, 1951. ii,241 p.

1574 Wifstrand, Albert. "EIKOTA 3." *Bulletin de la société royale des lettres de Lund* 8 (1933–34): 59–89.

1575 Wilamowitz-Möllendorff, Ulrich von. "Commentariolum metricum, I, II." *Indices lectionum ... aestivum et hibernum* (Göttingen, 1895): 3–32 and 3–34.

1576 ————. *Griechische Verskunst.* Leipzig: Weidmann, 1921. xi,631 p.

1577 ————. *Timotheos, Die Perser, aus einem Papyrus von Abusir im Auftrage der Deutschen Orientgesellschaft.* Leipzig: J. C. Hinrichs 1903; reprint (together with *Der Timotheos-papyrus, gefunden bei Abusir am 1. februar 1902,* Wissenschaftliche Veröffentlichungen der Deutschen Orient-Gesellschaft, vol. 3 [Leipzig: J. C. Hinrichs, 1903]), Hildesheim: G. Olms, 1973. 126 + 15 p. + 7 plates.

1578 Wilkinson, L. P. "Philodemus on Ethos in Music." *Classical Quarterly* 32 (1938): 174–81.

1579 Will, Cornelius. *Acta et scripta quae de controversiis ecclesiae graecae et latinae saec. XI composita extant.* Leipzig: n.p., 1861. x,272 p.

1580 Wille, Günther. "Die Bedeutung der Musik im Leben der Römer." Ph.D. dissertation, Tübingen, 1953. 785 p.

1581 ————. *Einführung in das römische Musikleben.* Die Altertumswissenschaft. Darmstadt: Wissenschaftliche Buchgesellschaft, 1977. v,214 p.

1582 ————. *Musica romana. Die Bedeutung der Musik im Leben der Römer.* Amsterdam: P. Schippers, 1967. 799 p.

1583 ————. "Singen und Sagen in der Dichtung des Horaz." *EPANION. Festschrift für Hildebrecht Hommel,* 169–84. Tübingen: Niemeyer, 1961.

Willetts, R. F. See item 257.

1584 Williams, Charles Francis Abdy. *The Aristoxenian Theory of Musical Rhythm.* Cambridge: Cambridge University Press, 1911. xvi,191 p.

1585 ————. *The Music of the Ancient Greeks.* London: Novello, 1894. 8 p.

1586 ————. "The Notes Mese and Hypate in Greek Music." *Classical Review* 12 (1898): 98–100.

1587 ————. "Notes on a Fragment of the Music of Orestes." *Classical Review* 8 (1894): 313–17.

1588 ————. "Present-day Accompaniment of Ancient Greek Melodies." *Zeitschrift der Internationalen Musikgesellschaft* 9 (1907–8): 248–51.

1589 ————. *A Short Account of the Music of the Greek Drama. Together with the Choruses of Sophocles' "Antigone" as Performed in the Greek Theatre at Bradfield College, June 1898 ... With an English Paraphrase by G. S. Freeman.* London: Breitkopf und Härtel, n.d. [1900?]. x,31 p.

1590 ————. "The 'System' in Greek Music—A Suggestion." *Classical Review* 9 (1895): 421–27.

Willis, James. See item 916.

1591 Wilson, James Cook. "*Musici scriptores graeci*: Emendations and Discussions." *Classical Review* 18 (1904): 387–91.
See items 723–24.

1592 Wilson, N. G. *From Byzantium to Italy: Greek Studies in the Italian Renaissance*. Baltimore, MD: Johns Hopkins University Press, 1992. xii,200 p.

1593 ————. *Scholars of Byzantium*. Baltimore, MD: Johns Hopkins University Press, 1983. x,283 p.

————. See also item 1204.

1594 Winnington-Ingram, Reginald P. "Ancient Greek Music: A Survey." *Music and Letters* 10 (1929): 326–45.

1595 ————. "Aristoxenus and the Intervals of Greek Music." *Classical Quarterly* 26 (1932): 195–208.

1596 ————. "The First Notational Diagram of Aristides Quintilianus." *Philologus* 117 (1973): 243–49.

1597 ————. "Greece I (Ancient)." In *The New Grove Dictionary of Music and Musicians*, ed. Stanley Sadie, 7:659–72. 20 vols. London: Macmillan, 1980.

1598 ————. "Greek Music (Ancient)." In *Grove's Dictionary of Music and Musicians*, 5th ed. by Eric Blom, 3:770–81. 9 vols. New York: St. Martin's Press, 1954.

1599 ————. "Kónnos, Konnâs, Cheride e la professione di musico." In *La musica in Grecia*, ed. Bruno Gentili and Roberto Pretagostini, 246–63. Storia e società. Roma-Bari: Laterza, 1988.

1600 ————. *Mode in Ancient Greek Music*. Cambridge: Cambridge University Press, 1936; reprint, Amsterdam: Hakkert, 1968. viii,90 p.

1601 ————. "The Pentatonic Tuning of the Greek Lyre: A Theory Examined." *Classical Quarterly* n. s. 6 (1956): 169–86.

1602 ————. "The Spondeion Scale." *Classical Quarterly* 22 (1928): 83–91.

1603 ————. "Two Studies in Greek Musical Notation." *Philologus* 122 (1978): 237–48.

————. See also items 48, 452, 653, 979, 1046, 1462, and 1504.

1604 Winternitz, Emanuel. *Musical Instruments and Their Symbolism in Western Art*. London: Faber & Faber, 1967. 240 p.

Wiora, Walter. See item 386.

1605 Wolf, Ernst. "Zur Etymologie von ῥυθμός und seiner Bedeutung in der älteren griechischen Literatur." *Wiener Studien* 68 (1955): 99–119.

Wolf, Johannes. See item 678 and 826.

Wolffheim, W. See item 678 and 826.

1606 Wright, F. A. "Greek Music." *Edinburgh Review* 220 (1914): 115–34.

1607 ———. "The Technical Vocabulary of Dance and Song." *Classical Review* 30 (1916): 9–10.

Wrobel, Ioh. See item 286.

Wycherley, R. E. See item 1044.

Xylander, G. See Holzmann, Wilhelm.

Ζαχαρίας, Προκόπιος Δ. See item 1195.

1608 Zambaldi, Francesco. *Elementi di metrica greca*. Torino: E. Loescher, 1893. iv,68 p.

1609 ———. *Metrica greca e latina*. Torino: E. Loescher, 1882. xv,679 p.

1610 Zaminer, Frieder. "Il contrapposto ritmico negli anapesti di marcia del dramma greco." In *La musica in Grecia*, ed. Bruno Gentili and Roberto Pretagostini, 183–88. Storia e società. Roma-Bari: Laterza, 1988.

1611 ———. "Griechische Musikaufzeichnungen." In *Musikalische Edition im Wandel des historischen Bewußtseins*, hrsg. Thrasybulos G. Georgiades, 9–27. Musikwissenschaftliche Arbeiten, vol. 23. Kassel: Bärenreiter, 1971.

1612 ———. "Griechische Musiktheorie und das Problem ihrer Rezeption." In *Über Musiktheorie. Referate der Arbeitstagung 1970 in Berlin*, hrsg. Frieder Zaminer, 9–14. Veröffentlichungen des Staatlichen Instituts für Musikforschung Preussischer Kulturbesitz, vol. 5. Köln: Arno Volk, 1970.

1613 ———. "Hypate, Mese und Nete im frühgriechischen Denken: Eine altes musikterminologisches Problem in neuem Licht." *Archiv für Musikwissenschaft* 41 (1984): 1–26.

1614 ———. "Konsonanzordnung und Saitenteilung bei Hippasos von Metapont. Wiederentdeckung eines frühen Lehrstücks." *Jahrbuch des Staatlichen Instituts für Musikforschung* (1981-82): 231–40.

1615 ———. "Pythagoras und die Anfänge des musiktheoretischen Denkens bei den Griechen." *Jahrbuch des Staatlichen Instituts für Musikforschung* (1979-80): 203–11.

———. See also items 199 and 1232.

1616 Zanoncelli, Luisa. "La filosofia musicale di Aristide Quintiliano." *Quaderni urbinati di cultura classica* 24 (1977): 51–93.

1617 ———. *La manualistica musicale greca: [Euclide]. Cleonide. Nicomaco. Excerpta Nicomachi. Bacchio il Vecchio. Gaudenzio. Alipio. Excerpta Neapolitana*. Ricerche. Milan: Guerini, 1990. 508 p.

See item 723.

———. See also items 27, 112, 333, 478, 523, and 1015.

1618 Ziegler, A. "Untersuchungen auf dem Gebiete der Musik der Griechen." *Programm-Lissa* (1866): 1–29.

1619 Ziegler, Konrat. "Orpheus." *Real-Enzyklopädie der klassischen Altertumswissenschaft* 35 (1939): 1251–53.

———. See also items 1103 and 1105.

1620 Zimmermann, Bernhard. "Critica ed imitazione. La nuova musica nelle commedie di Aristofane." In *La musica in Grecia,* ed. Bruno Gentili and Roberto Pretagostini, 199–204. Storia e società. Roma-Bari: Laterza, 1988.

Zingel, H. J. See item 1482.

1621 Zissi, Christina. *Ἡ ἀρχαιὰ Ἑλληνικὴ μουσική*. Athens: By the author, 1972. 23 p.

1622 Zubaty, Josef. "Nekteré myšlénky o vývoji metrické formy." *Listy filologické* 13 (1886): 19–35.

BLANK PAGE

Index of Names

Abucara, Theodore, 649, 651
Achilles, 92, 127, 133, 147, 178, 222, 234, 253–54
Admetus, 110, 144
Adrastus of Aphrodisias, 412, 417–20, 616
Æacus, 110
Aelian, 182, 186–87, 196–97, 216, 514, 517–18, 531
Aelius Aristides, 521
Aenesidamus, 138
Aeoladas, 86
Aeschylus, 12, 71, 95, 104, 106, 108–9, 122–25, 231, 259
  Persae, 70, 108–9
Agamemnon, 178, 253
Agapetus, Pope, 636
Agathon, 100, 104–5, 120
Agenor of Mytilene, 333, 408, 465
Aglaïa, 139
Aither, 223
Albinus, 412
Alcaeus, 32, 141, 145, 179, 251
Alcamenes, 181
Alcman, 82, 85–86, 179, 235
Alcmena, 107
Alexander (Polyhistor), 33, 59, 178
Alexander of Aetolia, 428–29, 493, 615
Alexander of Cythera, 270
Alexander the Great, 284
Al-Fārābī, 430, 610–12
Al-Haitham, 610
Alhazan. *See* Al-Haitham
Al-Kindī, 610
Al-Ma'mūn, 609
Al-Nadīm, Ibn, 610
Alypius, 8, 288–89, 292, 353, 368, 386–88, 495, 498, 500, 509, 520–21, 530, 535, 593–607
Amasis Painter, 127
Ambrose, St., 620
Ammonius, 132, 294, 355
Amphidamus, 31
Amphion, 33, 235, 407
Anacreon, 141, 144–45, 151, 251, 272, 274
Anaxagoras, 614
Anaxandrides, 146, 195
Anderson, Warren, 15
Andronicus II Palaeologus, 656
Andreas of Corinth, 217
Andreas of Panormus, 279
Anthes of Anthedon, 33
Antigenidas, 201
Antiochenes, 522
Antipatros, 226
Antoninus Pius, 355
Aphrodite, 34, 280, 397, 409, 428, 491–93, 570
Apollo, 4–5, 24, 26, 29, 32, 34–36, 39, 42–44, 47, 55–56, 58, 60–63, 71, 82–84, 87, 107, 110, 138, 141, 146, 161–62, 177, 179–81, 234, 236, 248, 253, 257–59, 269, 365, 525, 554, 562, 581, 616, 623, 663
Apuleius of Madaura, 391, 412
Araros, 195
Arcadius, 191–92
Ariadne, 258
Archilochus, 32, 71–74, 103, 141, 151, 235, 362
Archimedes, 279, 624
Architecture (personified), 625

Archytas, 172, 281, 294, 365, 412, 419, 436–37, 445–46, 458, 467–69, 471, 505, 514, 518, 635

Ardalus of Troezen, 59

Ares, 34–35, 155, 397, 428, 491–93, 570

Argos, 129, 238, 240

Argyros, Isaac, 431, 433, 466, 490, 494, 512

Arion of Methymna, 61, 74

Aristainetus, 522

Aristides Quintilianus, 6–7, 9–10, 25–27, 40, 61, 65, 72, 90, 105, 125, 131, 150, 153, 160–61, 169, 179–80, 230–31, 280, 289, 292, 324, 335, 338–39, 341–44, 353, 358, 363, 366–68, 372, 375, 377, 380, 382, 387–89, 394, 399–400, 411, 425, 429, 444–45, 455, 483, 486–87, 492, 495, 498, 507, 509, 519, 521–83, 585, 588–89, 591, 594–96, 598, 602–4, 607, 610, 612, 617, 622, 626–27, 634, 638–40, 642, 650, 658, 662–63, 665, 667

Aristogeiton, 147

Aristophanes, 12, 106–7, 122, 124, 130, 144, 146, 174, 238, 259, 549
  Acharnenses, 146
  Nubes, 174
  Pax, 130
  Ranae, 122, 238, 259
  Vespae, 144, 146

Aristotle, 6–7, 9, 60–61, 74, 80, 95–97, 99, 100, 136, 159–60, 164, 172, 182, 185, 198, 202–3, 210–11, 213, 215, 225, 233, 245, 253, 273, 294, 303, 314, 317, 320–21, 347, 358, 361, 363, 383, 412, 479–80, 511, 514, 517–18, 520, 526–27, 543–45, 549, 560–61, 569, 609, 613–14, 618, 624, 629–30, 638, 648, 650
  Analytica priora, 630
  Categoriae, 518, 630
  De anima, 160, 347, 518
  De audibilibus, 160, 185, 198, 202–3, 211, 215, 233, 514, 517–18, 520
  De caelo, 569
  De interpretatione, 630
  De mirabilibus auscultationibus, 164
  Ethica Nicomachea, 544
  Historia animalium, 569
  Metaphysica, 185, 314, 363, 560
  Organon, 648
  Physica, 303, 317, 347, 363, 527
  Physiognomonica, 561
  Poetica, 95–96, 99
  Politica, 6, 80, 172, 253, 544, 650
  Problemata, 60–61, 80, 99, 160, 210, 225, 245, 273, 358, 361, 383, 638–39
  Rhetorica, 80, 136, 526
  Sophistici elenchi, 630
  Topica, 314, 630

Aristoxenus, 9–10, 19, 33, 101, 104, 133, 152, 182, 193–94, 213–16, 226, 271, 277, 288, 292, 294–344, 346–47, 349–50, 352, 356, 358, 365–67, 369, 371–73, 375–81, 383–85, 387–91, 393, 395–96, 398–99, 404–5, 419–20, 423, 429, 435–37, 439, 442–47, 450, 459, 460, 463, 465–69, 471, 473, 499–501, 503, 505–6, 510, 514, 516, 526–29, 531–33, 538–40, 585, 590, 594, 596, 603–4, 606, 610, 614, 624, 627–28, 635, 642, 648, 650, 659, 662, 664–65, 667

Arithmetic (personified), 624–25

Artemis, 32, 34–36, 47, 55–56, 69, 76, 82–84, 107, 146, 170, 181, 234, 258, 270, 274

Artemon Kasandreus, 145, 267–68

Asclepiades, 639

Asclepius, 34, 36

Asopichus, 139

Asopodorus, 151

Astronomy (personified), 625

Athena, 34, 42, 47, 64, 76, 88, 146–47, 161, 177, 179–81, 220, 258, 554

Athenaeus, 8, 28, 68, 76, 92, 103, 145–46, 151–52, 154–56, 162, 170, 179, 182–83, 193–96, 223, 226, 231, 238,

267, 270–73, 276, 279–80, 284, 287, 291–92, 294, 510
Athenian Stranger, 26, 73, 362
Attalus, 279
Attis, 223–25
Augustine, 40, 169, 612, 614–15, 619–22

Bacchius Geron, 8, 65, 289, 292, 353, 368, 372, 377, 380, 382, 495, 498, 509, 521, 523–24, 583–94, 607, 620, 651, 667
Bacchus, 47–48
Bacchylides, 32, 76, 78, 83, 85, 91, 140–41, 152
Bacon, Roger, 611
Barbera, André, 345
Barlaam of Calabria, 433, 491, 493–94
Basil II, 643–44, 646
Bellermann, Friedrich, 293, 524, 585, 591, 605, 651, 664–65
Berlin Painter, 260–63, 266
Bernelinus, 619
Bessarion, Cardinal, 296, 413, 432
Biton, 279
Boethius, Anicius Manlius Severinus, 67, 329, 344–45, 348, 391–92, 401, 406, 408–11, 429–30, 495, 498, 504, 507, 511, 582, 594, 607, 612, 616, 619, 629–36, 640, 657, 660, 665
Bower, Calvin M., 392, 630
Braulio, Bishop of Saragossa, 640
Bromius, 76, 93
Bryennius, Manuel, 293, 366–67, 380, 382, 389, 411, 430, 433, 520, 581, 582, 584–85, 592–93, 643, 648, 651, 655–58, 660–68
Brygos painter, 164
Bubastis, 163
Bücken, Ernst, 13–14
Burana, Francesco, 582

Cadmus, 408
Caerellius, Qu., 614
Calcidius, 612, 616–19, 630
Caldwell, John, 635
Callimachus, 656
Calliope, 58, 70
Callistratus, 146
Capella, Martianus, 411, 495, 498, 521, 523–24, 582, 607, 612, 614–15, 618, 622–23, 626–28, 630, 637, 639, 665
Cassandra, 129
Cassiodorus, Flavius Magnus Aurelius, 498–99, 509, 520, 582, 594, 606–7, 612, 615, 619, 636–40, 665
Castor, 248
Cecrops, 47
Cedon, 147
Censorinus, 568, 612, 614–15, 617, 619, 630, 637–38, 641
Cerularius, Michael, 646
Choeroboscus, George, 524
Chrysostomus, St. John, 131
Chrysothemis the Cretan, 61
Cicero, 132, 521, 543, 546, 613, 618, 622, 630
Cinesias, 66
Clearchus, 151–52
Clement of Alexandria, 637
Cleodamus, 140
Cleon, 43, 55
Cleonides, 8, 150, 292, 334, 345–46, 352–53, 366–390, 392–93, 395, 405, 414, 429, 443–45, 458–61, 463–64, 477, 494, 499, 503, 505–6, 510, 520, 523, 524, 526–28, 530–31, 533, 535, 537–38, 588, 594–96, 610, 616, 627–28, 642, 648, 650, 660–62, 664–65, 667
Cleophon, 123
Clonas, 59, 63–64, 82
Commodus, 497
Comnenus, Isaac, 646
Comotti, Giovanni, 14
Constantine the Great, 497, 583–85
Constantine VII Porphyrogenitus, 584–85, 644

Constantine VIII, 644
Constantine IX Monomachus, 394, 644–45
Constantine X Ducas, 646
Contractus, Hermannus, 611
Corinna, 179
Crassus, 173
Crates, 64, 155
Cratinus, 167
Creusa, 110
Crexus, 66, 72
Cronus, 68
Ctesibius, 226
Cybele, 163–64, 173, 175, 177, 223
Cypselus, 196

Da Feltre, Vittorino, 432
Da Rios, Rosetta, 299, 319–20
Damon, 519, 550
David, 639
Del Lago, Giovanni, 509
Demeter, 34, 146
Democritus, 518, 624
Demodocus, 23, 253
Dialectic, 624
Dicaearchus, 145, 170
Didymus, 170, 272, 436, 457–58, 467–68, 470–71, 514–16, 590
Dio Chrysostomus, 154
Diocletian, 497
Diodorus of Thebes, 183–84
Diodorus Siculus, 180, 223
Diogenes Laertius, 294
Diogenes of Oinomaos, 274
Diomedes, 147
Dionysius of Halicarnassus, 40, 76, 80, 121–22, 124, 136, 139, 149, 524, 538, 543, 549, 583–85, 592–93
Dionysius, tyrant of Syracuse, 294
Dionysus, 26, 34, 36, 38, 43–45, 55–56, 71, 74–78, 83, 88, 94, 122–23, 135, 143, 147, 163–64, 175–77, 185, 252–54, 257–58, 267
Diophantus, 657
Douris, 248
Düring, Ingemar, 431–33, 512

Earth (personified), 102, 428
Echo, 140
Eëtion, 254
Elpinikos, 43, 55
Empedocles, 414
Engelbert of Admont, 619
Enyalius. *See* Ares
Eos, 248
Epaminondas, 184
Epicharmus, 146
Epicurus, 614, 624
Epigonus, 270–71
Epiktetos, 164, 197, 232
Eratocles, 309, 333, 465, 506
Eratosthenes, 428, 466–68, 470–71, 614
Eriphanis, 152
Eros, 248, 252
Ether, 102
Euathlus, 152
Eubulides, 401
Euclid, 8, 288, 345–46, 363–64, 366–68, 594, 610, 625, 642
Eudoxius, 514
Eudoxus, 419
Eumelos, 82
Euphorion, 223, 279
Euphrosyne, 139
Euripides, 12, 42, 65, 70, 100, 102–6, 109–10, 116, 120–25, 129–130, 231, 252, 259, 593
    Alcestis, 110
    Chrysippos, 102
    Cyclops, 252
    Hercules furens, 110
    Ion, 110

Iphigenia Aulidensis, 12, 70, 109–10, 122, 124, 129, 593
Orestes, 70, 110, 116, 120–22, 124, 593
Troades, 129
Eusebius, 394, 522, 525
Euterpe, 180
Euyrale, 64

Fate, 39, 135
Florentius, 394, 522, 525

Gaffurio, Franchino, 520, 582, 619
Galen, 543, 561
Galilei, Vincenzo, 607
Ganymede, 110
Gaudentius, 8, 292, 353, 372, 377, 380, 382, 417, 440, 444–45, 495, 498–509, 520–21, 523–24, 526, 530–31, 535, 588–89, 594–96, 602–4, 606–7, 617, 633, 637–39, 648, 650, 662
Geometry (personified), 624
Gerard of Cremona, 611
Glaucus of Rhegium, 33, 59
God, 617, 621, 663, 667
Grammar (personified), 624
Gregoras, Nicephorus, 431, 433, 466, 490–91, 493, 512, 656
Gregorius Solitarius, 649
Gundissalinus, Dominicus, 611–12

Hades, 122
Hadrian, 355–56, 394, 521
Hagesichora, 85
Harmodius, 144, 146–47
Harmony (personified), 625–28
Hawkins, Sir John, 3
Hector, 133
Helen, 138
Hephaestion, 90–91, 98, 103, 129, 155, 523, 538, 541, 549, 622
Hephaestos, 42
Hera, 34, 258
Heracleitus, 543, 554, 614, 624
Heracles, 122, 196, 235, 258, 263, 407
Heraclides Ponticus, 33, 59
Heraclides (Ponticus the Younger?), 514, 517
Heraclides of Tarentum, 279
Hermaios painter, 164
Hermes, 34–36, 161, 177, 180, 223, 234–35, 237–38, 240, 243, 248, 258, 397, 407–9, 428, 492, 570, 663
Hermippus, 170
Hero of Alexandria, 226, 228–29
Herodotus, 62, 74, 163, 274
Hesychius, 196, 221, 238, 241, 262
Hesiod, 31, 251, 567–68
Hestia, 34
Hieron, 141, 145
Hippasus, 147, 401, 412
Hippocrates, 614
Histiaeus of Colophon, 247, 409
Homer, 31, 102, 123, 235, 251, 511, 554, 578, 624
Hornbostel, 159
Horace, 100, 106, 183, 190–91
Humbert, Cardinal, 644
Hyagnis, 178
Hygieia, 36
Hymen, Hymenaios, 39, 126–27, 129–30, 134–35

Ialemos, 134
Iamblichus, 294, 363, 392, 425, 523, 543
Ibycus of Rhegium, 276
Ion, 384–85
Iphicles, 255
Iphigenia, 112
Isidore of Seville, 612, 615–16, 640–41
Isis, 172

Jacques de Liège, 619

Jairus, 132
Jan, Karl von, 69, 370–71, 589
Jerome of Moravia, 612
Jesus, 132
Jews, 394
John of Seville, 611
John Scotus Erigena, 618
Josephus, 132
Jove. *See* Jupiter
Juba, 270, 276
Jupiter, 491, 623, 625–26
Justinian, 642

Kepler, Johannes, 6
Kiesewetter, Raphael Georg, 3
Kircher, Athanasius, 2
Kleophrades Painter, 176, 219
Korybantes, 173
Kronos, 396, 409, 428, 491, 493, 570
Kuhnau, Johann, 60

Lamprus of Erythrai, 294
Lasus of Hermione, 74–76, 271, 303, 442, 627
Latona, 58
Leichudes, Constantine, 645–46
Leontius, 649, 651, 655
Leophantus, 590
Leto, 35, 38, 47, 55–56, 82–84, 135, 146, 181, 258, 283
Leucapsis, 273
Libanius of Antioch, 522
Limenios, 44–45, 47, 55–56, 82
Linus 39, 134–35, 235, 255, 407, 624
Longinus, 511
Lucian, 131, 238
Luna, 625
Lysander, 271
Lysias, 32–34, 38, 59, 61, 63–66, 82, 88, 92, 178, 356–60, 362, 365

Macrobius Ambrosius Theodosius, 612, 614, 616–19, 625, 630
Macrobius Plotinus Eustathius, 618
Magister Lambert, 612
Maia, 35
Malkos, 511
Marcellus, 279
Marcianus Aristides, 521
Marcus Aurelius, 355, 497
Mariades, 522
Marius Victorinus, 169, 511
Marpurg, F. W., 3
Mars, 491
Marsyas, 161–62, 178, 180–81, 220–21, 223, 259, 554
Martini, G. B., 3
Massourios, 279–80
Mattheson, Johann, 3
Matthew, 132
Medicine, 625
Mei, Girolamo, 2, 509, 607
Meibom, Marcus, 2
Melanippides, 66, 75, 80, 133, 179, 247
Meletus, 123
Menalcas, 152
Mercury, 623–25
Mesomedes, 56–57, 584
Messiaen, Olivier, 6
Metochites, Theodorus, 346, 643, 656–57
Metrodorus of Chios, 223
Michael VI Stratioticus, 646
Michael VII Ducas, 647
Michael VIII Palaeologus, 656
Michaelides, Solon, 14
Midas, 64, 138
Miletus, 70
Mimnermus, 59, 64
Mizler, Lorenz Christoph, 3
Mnesias, 294
Moon, 396–97, 409, 428, 570, 578

Moschos, 279
Muhammed, 609
Musaeus, 31–32, 212, 266
Music (personified), 66–67
Mutianus, 499, 637
Myron, 181

Neanthes of Cyzicus, 276
Nereus, 110, 623
Neubecker, Annemarie Jeanette, 14
Nicephoritzes, 647
Nicolaos Kalligraphos, 648
Nicomachus of Gerasa 8, 68, 226, 241, 243–45, 292, 353, 363, 372, 377, 380, 382, 390–412, 415, 418–20, 426, 429, 433, 441, 443, 492, 494–95, 498–500, 503–4, 506, 521, 523, 526, 531, 558, 571, 582, 590, 594, 607, 625, 631, 633–35, 642, 648, 650, 664–65
Nietzsche, Friedrich, 4
Nike, 258, 267
Numa, 546

Ocean, 47
Odoacer, 629
Odovacar. *See* Odoacer
Oenoe, 223
Olen, 31
Onesicrates, 32, 356, 365–66
Orpheus, 31–32, 70, 235, 266, 407, 624, 639
Opora, 130
Ovid, 223

Pachymeres, George, 411, 430, 582, 643, 648, 651, 655–58, 663–64, 668
Pagôndas, 86
Pamphus, 31
Pamphylian, 428
Pan, 34, 146, 223
Panaetius, 514, 517–19
Pan-Painter, 212
Pappus, 367–68, 414, 512
Paris, 248
Parmenides, 614
Pausanias, 8, 31–33, 67, 82, 151, 153, 181, 183, 196–97, 238, 355
Peisistratus, 94
Peleus, 110, 258
Periander, 74
Perrett, Wilfrid, 5
Persephone, 64, 140
Perseus, 64
Phaedrus, 590
Phemius, 23, 253
Pherecrates, 66–67, 80, 90, 92, 105, 247, 409
Philion, 55
Phillis of Delos, 279
Philo Byzantius, 225–26, 228
Philochorus, 271
Philodemus of Gadara, 292
Philolaus, 395, 401–2, 412, 504, 531, 614, 633
Philology (personified), 623
Philoponus, John, 642
Philosophy (personified), 623
Philostratus, 238
Philoxenus, 66, 75, 80, 133
Phintas, 82
Photius, 8, 28, 127, 291, 643, 649, 651, 655–56
Phronesis, 623
Phrynichus, 104, 123
Phrynis of Mitylene, 61, 66
Pieria, Mount, 70
Pierides, 47, 110
Pindar, 32, 38–39, 64, 71, 74, 76, 78, 83, 85–86, 88, 90–92, 134, 136–40, 145, 234, 251, 274
Pittacus, 155
Planudes, Maximus, 643, 651, 656–57
Plato, 6–7, 26–27, 32, 60–61, 71, 73, 101, 105, 132–33, 141, 144–46, 148, 159–

60, 209, 222, 234, 271–72, 294, 321, 362, 364–65, 400, 410–12, 415, 417, 419–21, 424, 428, 479–80, 511, 520, 525–27, 532, 543–46, 548, 550, 552–53, 558–61, 563, 568–69, 574, 576, 579, 609, 613–14, 616–18, 621, 624, 629, 645, 650, 655
  Alcibiades, 209
  Gorgias, 144–46, 148
  Leges, 6, 26, 60, 71, 73, 101, 132, 160, 271, 362, 543–44, 548, 552, 561, 568, 579
  Parmenides, 364
  Phaedrus, 543–44, 560
  Respublica, 6, 27, 32, 60, 160, 222, 428, 480, 532, 543–45, 548, 559–61, 568–69
  Symposium, 141, 548
  Theaetetus, 527
  Timaeus, 6, 362, 400, 410–12, 417, 419–20, 424, 543–44, 553, 558–59, 563, 569, 574, 576, 616–17, 622, 650
Plato of Tivoli, 611
Pleasure (personified), 624
Pliny, 561, 613
Plotinus, 9, 412, 511, 521, 523–24, 543, 548, 553, 560, 579
Plutarch, 7–8, 34, 59, 63, 71, 82, 85, 89–90, 92, 105, 120, 132–33, 141–43, 145, 151–52, 154–55, 173–74, 178–79, 185, 213, 215–17, 220–21, 246, 293–94, 355–66, 409, 412, 420, 425, 429, 460, 487, 494, 498, 509, 523–25, 532, 537, 543, 556–69, 574–75, 650
Polematas, 87
Pollux, 8, 63, 82, 97–98, 131, 151, 155, 162, 167, 172, 182–85, 194–96, 223, 225, 229, 231–32, 238, 241, 248, 262, 270, 284, 291–92, 355
Polybius, 154, 279
Polymnestus, 59, 64
Polymnis, 184
Porphyrius, 3, 9–10, 182, 226, 289, 292, 294–97, 335, 340, 345–46, 349, 353, 430, 433, 439, 502–3, 509–20, 515, 522–24, 531, 543, 549, 553, 556, 622, 630, 658
Poseidon, 258
Pratinas, 88, 92
Praxilla, 145
Praxiteles, 181
Proclus, 28–30, 36–37, 46, 61, 65, 74–75, 77, 81, 86, 91, 99, 104, 125–26, 131–32, 143–44, 146, 151, 209, 217, 258, 650
Pronomus, 153, 183–84
Prophrastus of Pieria, 247
Psellus, Michael, 99, 101–5, 109, 119–20, 259, 335, 394, 592, 643–51, 655–57, 668
Ptolemaïs, 430, 514–16
Ptolemy, Claudius, 3, 6, 9–10, 150, 182, 226, 241, 292, 295–96, 309, 329, 334–35, 344–45, 353, 377, 380, 382, 384, 391, 399, 407, 409, 429–95, 498, 502–3, 505–6, 510–18, 520–24, 526, 531, 555–56, 569, 571, 581–82, 588–89, 594–95, 607, 610, 631, 634–35, 638–39, 642, 650, 656, 658, 662–64, 666–67
Ptolemy II, 24
Pyrrhus, 92
Pythagoras, 244, 279, 284, 294, 347, 394, 397–99, 401–2, 407, 411, 418–19, 441, 503, 511, 514, 614, 617–18, 624, 632–38
Pythagoras of Zacynthos, 267–68, 333, 465
Python, 60, 133

Quintilianus, M. Fabius, 521, 613

Reese, Gustave, 12
Regino of Prüm, 619
Reinach, Théodore, 13, 55, 649
Remy of Auxerre, 618
Rhetoric (personified), 624
Rhonaces, 223

Richter, Lukas, 648–49
Riethmüller, Albrecht, 15
Robert of Chester, 611
Romanus III Argyrus, 644
Romanus IV Diogenes, 646–47, 649
Romulus Augustulus, 629
Roscius, 546
Rose, V. 649

Sacadas, 59, 64–65, 153
Sachs, Curt, 13, 159
Salinas, Francisco, 509
Sambyx, 279
Sappho, 32, 104, 129, 151, 235, 251, 274
Saturn, 491
Satyrus, 65
Saul, 639
Scheurleer painter, 233
Seikilos, 148, 151
Semele, 74–75
Semus of Delos, 155, 279
Seneca, 613
Seuthes, 223
Sextus Empiricus, 7, 102, 109, 126, 153, 292, 483
Silenus, 223, 252
Simonides, 83, 85, 134–36, 143, 146, 220
Sirens, 85, 428, 639
Slayer of Argus. *See* Hermes
Socrates, 27, 294
Solomon, Jon, 661
Sophocles, 12, 95, 100, 102–3, 106–7, 109, 122–23, 125, 132, 231, 238, 259, 267, 274, 276
  Ichneutai, 238
  Mysians, 276
  Thamyris, 259, 267, 274
  Trachiniae, 107
Soterichus, 66, 72–73, 75, 82–83, 85–86, 92, 103–5, 133, 145, 152, 155, 179, 217, 231, 356, 359–65, 399–400, 419
Spintharus, 294
Stesichorus, 33, 143, 152
Stobaeus, 134, 294
Strabo, 24, 43, 63
Sun, 396–97, 428, 570
Symmachus, Q. Aurelius Memmius, 629

Telamon, 144
Telecleides, 155
Telephanes of Megara, 217–18
Telestes, 80, 294
Terpander, 34, 59, 61, 63, 66, 70, 74, 82, 145, 235, 243, 245, 251, 274, 384, 407, 616
Terpsichore, 126
Thales, 624
Thaletas, 38
Thalia, 139
Thamyris, 235, 259, 266–67, 407
Themistius, 294
Theoderic, 629, 636
Theodosius, Macrobius Ambrosius. *See* Macrobius Ambrosius Theodosius
Theodosius II, 511
Theognis, 141, 235
Theon of Smyrna, 8, 292, 329, 353, 364, 367, 372, 412–29, 439–41, 487, 492–94, 499–500, 502–3, 506, 510, 521, 523, 556, 558–59, 569, 571, 591, 615–17, 625, 633, 648, 650–51, 662
Theophilus, 273
Theophrastus, 182, 198–203, 218, 231, 237, 294, 514, 517–19, 543, 549, 614
Theophrastus of Pieria, 409
Theron, 138
Theseus, 88
Thetis, 110, 258
Thoinos, 47, 82
Thrasyllus, Claudius, 391, 412, 417, 422–23, 514, 531
Thrasyllus of Phlius, 217
Thucydides, 34, 154

Timosthenes, 24
Timotheus of Miletus, 61, 65–71, 75, 80, 103, 133, 247, 362, 409, 616
Tityus, 47, 55
Tritonid goddess, warrior. *See* Athena
Trajan, 355–56
Trivizias, George, 432
Trugaios, 130
Tryphon, 155
Tydeus, 147
Tyndareüs, 138
Tyrtaeus of Mantinea, 154, 217

Valgulio, Carlo, 520
Valla, Giorgio, 520
Varro, Marcus Terentius, 568, 613–14, 619, 622
Venus, 491, 624–25
Verdi, Giuseppe, 5
Vetter, Walther, 13
Vettori, Piero, 2
Vincent of Beauvais, 611
Virgil, 618, 624
Vitruvius, Pollio, 1, 5, 226, 229, 613

Wagner, Richard, 5
Wallis, John, 2
Washing Painter, 277
Wegner, Max, 13
West, Martin, 15
Wille, Günther, 14
Wilson, Nigel, 656

Xanthus, 86
Xenakis, Iannis, 6
Xenocritus, 38
Xenodamus, 38, 88, 92
Xenophilus of Chalcis, 294
Xerxes, 108–9
Xiphilinus, John, 645–46

Zaminer, Frieder, 15
Zarlino, Gioseffo, 509
Zeno, 624
Zeus, 4, 31, 35–37, 42, 47, 68, 74–76, 107, 110, 258, 397, 428, 491, 493, 570, 572
Zoroaster, 511
Zosimus, 366–68

Index of Places and Subjects

accompaniment, 23, 30, 33, 59, 72–73, 82, 86, 101, 125, 137–38, 155, 157–60, 164, 170, 194, 231, 248, 258–59, 274, 359–62, 502, 508, 551
Achaea, 18
Achaean League, 55
Achaeans, 18, 29, 70
Acragas, 64, 138
Acropolis, 94, 181, 258
actuality, 544, 547, 551–52, 554, 572
Aeolians, 18, 87
aerophone, 159, 162, 176–234, 237, 285
Aetna, 141
Aetolia, 18
Afghanistan, 174
Africa, 617
Africa, North, 609, 620, 622
African coast, 18
air, 173, 203–4, 207, 227–29, 240, 298, 305, 397, 403, 425, 437
Al-Andalus, 611
Albania, 18
Alexandria, 226, 477, 629, 642
  Library and Museum at, 355, 431
Amazons, 154
amphora. *See* music, ancient Greek—source materials—graphic and plastic art
Antioch, 522, 642
antistrophe, 33, 60, 76–78, 80–81, 86, 98–99, 107–8, 137–38, 541
Antissa, 70, 235
Apulian instrument. *See under* psalteria
Aquincum, 229
Arcadia, 35
archaeological remains. *See under* music, ancient Greek—source materials
Argolis, 18
Aristoxenians, 351, 366, 376, 379, 390, 395, 405, 435, 438, 442, 445, 449, 462, 499, 501, 516, 528, 588
Arne, 87
arsis and thesis, 65, 72–73, 90, 163, 168, 339, 341–42, 539, 574, 577–78, 587–88
Artists of Dionysus, 55–56
Asia Minor, 18, 177, 277, 412
Assembly, 67
Assyrians, 284
Athenaeum, 355
Athenian treasury, 39
Athenians, 39, 122, 323
Athens, 18, 71, 94, 122–23, 144, 147, 294, 355, 412, 511, 629, 642
Attica, 4, 18, 42
aulete, 24, 43–44, 59, 75, 78–79, 81, 83, 92, 101, 106, 128, 132–33, 138, 141, 155, 160, 164, 167–68, 175, 178, 183, 191, 197, 207, 210, 212–13, 215–21, 228, 258, 357, 359, 589
aulos, 4, 11, 24–25, 27, 30, 39, 42–44, 47, 55, 59, 61, 64, 75, 78, 82, 86, 92–93, 105–7, 110, 123, 126–28, 131–33, 137–38, 148, 153, 155, 160–62, 164, 167, 175–223, 225, 228–29, 231–32, 237–38, 246, 252–53, 271–75, 282, 297, 321–23, 357, 403, 441, 457, 515, 518, 520
Ausonian headland, 39

Bacchanals, 107
Bacchiade, 196
barbitos. *See under* lyre
Basel, 4
bassoon, 202
bells, 172, 174
Beirut, 642

Benedictine Rule, 636
Bibliotheca Ulpia, 355
Boeotia, 18, 33, 86, 183, 355
Boeotians, 87, 167
Bologna, 609
bombyx, 184–88, 191–92, 197, 199, 207, 210, 212, 228
Bourja, 148
Boston, Museum of Fine Arts, 232
British Museum, 170–71, 187, 194, 219, 238, 243, 260
Bulgaria, 18
Byzantium, 18, 643–44, 647

Calabria, 18, 294, 636
Cambridge, 609
canon, 241, 346, 351, 413, 416, 421–22, 434–36, 438, 441–42, 449, 451–52, 455, 457, 466, 477–78, 503, 515, 519, 523, 584, 592–93, 651, 659
Carians, 195–96
Caspian sea, 174
Castalia, 42
castanet, 123, 163, 172
Castellani collection, 194
Celaenae, 223
Celts, 177, 223
Centaurs, 110
Chalcedon, 636
Chalcidians, 184
Chalcis, 31
chelys. *See under* lyre
choir, 43, 45, 55, 85, 128, 138
chordophone, 159, 162, 234–86
choregos, 79, 81, 95
chorus, 23, 31, 61, 71, 74, 76, 78, 82–83, 85–88, 92, 94–97, 99–101, 103, 106–10, 112, 120, 123, 125, 127–31, 130–31, 137, 139, 167–68, 274
chromatic genus. *See under* genus
chronos, 25, 90, 114–15, 119, 121, 136, 150, 295, 335, 337–43, 501, 539, 552, 588, 590
clarinet, 187
coins. *See* music, ancient Greek—source materials—graphic and plastic art
cola, 46, 82, 98
composer, 33, 44, 59, 63, 65–66, 71, 80, 92, 95, 120, 235, 267
composition, 4, 8, 23–26, 29, 32–34, 39, 42, 44–45, 59, 63, 66, 71–74, 77–78, 82–83, 85, 94, 99, 103–4, 131, 135–39, 145, 148–51, 155, 218, 221, 287, 303, 306, 319, 324, 334, 337, 339–41, 343–44, 370–72, 387–89, 425, 477, 501, 527, 531, 534–35, 537–38, 540, 542, 577–78, 587, 589, 594–95, 650, 660, 665, 667
  notated. *See* music, ancient Greek—source materials—notated musical compositions
consonance and dissonance, 8, 199–200, 212, 218, 243, 273, 287, 300–331, 307, 310–11, 317, 320, 324–25, 327–29, 344, 347, 351–52, 359–62, 370, 375, 377–79, 388, 394, 397, 404–5, 407, 414, 416–18, 420, 423, 434–37, 439–41, 445, 451, 456, 458, 464, 480, 484, 487, 499, 502–3, 519, 523, 528, 556–60, 573–74, 576, 578, 583–84, 586–87, 591, 593, 603, 615, 617–18, 626–27, 631–34, 638–40, 650, 657–59, 664–65
Constantinople, 368, 629, 636, 641–42, 646–47, 655–56, 660
Copaïs, Lake, 198
Copenhagen, Danish National Museum, 148, 189, 192
Cordova, 609
Corinth, 74, 294
Corinthians, 323
Crete, 18, 88
Cretan hounds, 47
Cretans, 37, 91, 155, 231

Cylene, 35
cymbals, 170
Cynthian isle, 47
Cyrene, 124

dance, Greek, 25, 47, 74, 76, 83, 86, 89–94, 101, 107, 110, 123, 125, 127–28, 138–39, 147, 156–57, 175, 178, 196, 252–53, 272, 295, 539, 621
dancer, 64, 78, 89, 110, 141, 164, 166, 170, 546
daphnephoria, 87–88
daphnephorika, 28, 86, 88
De Jong Collection, 148
Delos, 32, 34, 71, 82–84, 146, 179, 184
Delphi, 39, 42–43, 47, 55, 71, 106, 132, 356
Demiurge, 563
Dia, island of 88
diatonic genus. *See under* genus
diction, 25, 33, 62, 74, 96, 106, 121, 308–9, 337–39, 508, 542, 547–49, 552, 590–91
diesis, 305, 312, 315–16, 322, 325, 331, 357–58, 373, 375, 401, 405, 416, 418–20, 423, 508, 528–30, 537, 555, 560, 563–64, 586–88, 598, 600, 602, 627
Dionysia, 78, 95, 122
Dionysus, Artists of, 43, 45
Dionysus Eleuthereus, 94
dirge, 26–27, 38, 64, 110, 123, 134–35
dissonance. *See* consonance and dissonance
dithyramb, 23, 26–29, 38, 62, 65–66, 71–81, 93, 95, 99, 103–4, 135–36, 157, 194
Dodona, 88
Dorians, 18
Dotion, 90
drama, ancient Greek, 5, 29, 44, 94–97, 99–101, 103, 125, 129, 157, 166, 287
drinking cups. *See* music, ancient Greek—source materials—graphic and plastic art
drum, 163–64, 173–76
dulcimer, 236

education
  ethical, 550, 552
  music, 257, 544
Egypt, 18, 191, 355, 408, 430
Egyptians, 18, 194–95
eklusis and ekbole, 358, 537, 586, 589
Elgin auloi, 187–89, 192, 205, 207–10, 214, 217, 238
Elysium, 248
emmelic, emmeleia, 99, 101, 436
encomion, 28, 30, 125, 134, 274
England, 5
enharmonic genus. *See* harmonia (enharmonic) *under* genus
Ephesus, 270, 636
epigoneion. *See under* psalteria
Epigonians, 303, 442
epikedeion, 28, 125, 132–33
epilogos, 63, 70
epinikion (epinikon), 28, 125, 135–41, 157
episodion, 96, 98, 100
epithalamion, 28, 125–31, 151
epithet, 30, 37, 42, 61, 67, 85, 548
epode, 33, 72, 86, 99, 108–9, 129, 137–38
erotica, 28, 125
ethos, 180, 321, 360–61, 365, 388–89, 483–84, 528, 537–38, 540, 545–48, 550–52, 554, 561, 581, 587
Etruscans, 231
Euboea, 18
Euripus, 184
eutika, 28
exodos, 74, 96, 98–99, 108

- festivals and games, 11, 31, 34, 39, 43–44, 48, 55, 59, 65, 71, 76–77, 81, 87–88, 94–96, 122, 125, 127–28, 135–36, 138, 141, 157, 177–78, 217–18, 222, 236, 259, 267, 272, 279
- flute, 182, 194
- form, 23–24, 26, 29, 58, 60, 89, 95, 101, 108, 129, 168, 177, 272, 337, 341, 344, 379, 381–82, 398–99, 414, 416, 451, 494, 552, 588, 603, 631

- games. *See* festivals and games
- Gauls, 55
- Gaza, 642
- gemstones. *See* music, ancient Greek—source materials—graphic and plastic art
- genus, 30, 65, 73, 86, 88–89, 103, 105, 180, 300–301, 307, 310–14, 317, 319–20, 322, 324–26, 330–33, 337, 340–43, 350–52, 357, 360, 370–73, 375–78, 380–81, 388, 395, 404–5, 407, 409, 418, 432, 434–36, 445–47, 450–52, 455–60, 465–67, 469, 473, 477, 482, 484, 487–88, 501–2, 509, 527–28, 531, 537, 539–40, 562–63, 586–87, 589, 594–97, 621, 631–32, 634, 650–51, 657, 659–60, 663, 667
  - names of
  - chromatic, 80, 103–5, 120, 217, 301, 310–11, 331–32, 357, 370, 373, 375–76, 405, 428, 446–47, 454, 457–58, 466, 469–70, 473, 482, 488, 502–4, 508, 586, 596–97, 660
  - diatonic, 80, 103, 301, 310–11, 330, 332, 351, 357–58, 360, 370, 373, 375–77, 395, 399, 405, 428, 446–47, 450–51, 453–54, 457–59, 466, 471–73, 488, 502, 508–9, 550, 563, 586, 596, 659–60
  - harmonia (enharmonic), 80, 103, 160, 301, 310–11, 330–32, 352, 356–57, 359–60, 370, 373, 375–77, 380–81, 405, 446–47, 466, 468, 482, 488, 502, 508, 531, 586, 596–97, 660, 664
- Gentiles, 394
- Gerasa, 394
- glockenspiel, 282
- gnomologika, 28
- gods. *See* music, ancient Greek—types of
- Gorgons, 64
- Graces, 39, 64, 179, 623
- guitar, 257

- harmonia, 39, 62, 66, 133, 136–37, 160, 183–84, 267, 272, 295, 301, 313, 324, 358, 363, 366, 370, 373, 377, 380–81, 385, 394, 399–402, 407, 410–12, 414–17, 419, 421–22, 424, 428, 435, 455, 478–79, 482–531, 542, 544, 547–48, 551–53, 555, 562, 604, 615–16
  - *See also under* genus—names of
- Harmonicists, 300–302, 309, 311, 315, 318, 322–24, 326, 334, 352, 366, 381, 383, 387, 396, 434, 465, 474, 499, 506, 528, 540, 588
- harmonics, 210–11, 215, 225, 232, 248, 301, 362, 394, 434, 436–39, 455, 477, 493, 498–99, 501, 514–15, 521, 527, 538–40, 585, 590, 594, 616, 626, 638, 664–65, 667
  - science of, 1, 301, 304–5, 318–19, 321, 323, 337–38, 362, 365–66, 369–70, 372–73, 387, 450, 479, 541, 595
- harp, 67, 132, 212, 236
- Helicon, Mount, 42, 47, 87, 254
- Helicon instrument. *See under* monochord
- heptachord, 244–46
- Hippo, 620
- horn, 173, 176, 230–34
- House of Wisdom, 609
- hydraulis, 176, 225–30

hydria. *See* music, ancient Greek—source materials—graphic and plastic art
hymenaios, 28, 110, 125, 126–31, 135, 151, 178, 195
hymn, 4, 7, 19, 23–24, 26–39, 42–43, 47, 56–58, 65, 69–70, 81–84, 86–87, 103, 126, 135, 141, 157, 164, 170, 222, 234, 237, 240–41, 243, 251, 253, 258–59, 365, 389, 584, 594
hyporcheme, 28, 38, 42, 88–94, 101, 157

idiophone, 159, 162–76, 230, 237, 285
Ilion, 178
imitation, 60–61, 80, 89, 123, 128, 271, 394, 544, 560, 663
Indians, 174
instrumental music, 23–24, 44, 160, 271–72
instruments, musical, 7, 8, 11–12, 17–18, 35, 43–44, 59, 64, 93, 101–2, 127, 131–32, 142, 154, 157, 159–286, 295, 311, 319, 321, 361, 383, 397, 439, 441, 451, 457–58, 476–77, 514–16, 518, 520, 547, 550–54, 560, 572, 595, 626, 635, 638, 658–59
    See also names of individual instruments
invocation, 35, 42, 55
Ionians, 18
Iran, 174
Islam, 609
Italian peninsula, 18, 294
Italy, 18, 647
Izmir, 148

Janissary bands, Turkish, 230
Jotopata, battle of, 132

Karapanos Collection, Athens National Archaeological Museum, 190, 192
katatropa, 63
Keros, 17
kithara. *See under* lyre
kitharist, 24, 43–44, 59, 258–61, 264, 267
kitharode, 33, 61–62, 74, 258, 260–61, 269, 356
kitharodia, 44
kommos, 96, 99, 101, 108
koruphaios, 97–98, 100–101, 168
krembala. *See* kumbala
krotala, 76–77, 85, 163–66, 170–72
kroupala. *See* kroupezai
kroupeta. *See* kroupezai
kroupezai, 162, 166–71
krummhorn, 228
kumbala, 163–64, 170–71, 175

Laconia, 18
lamentation, 96, 132–33, 153
Leiden, 116
Lesbos, 70, 145, 235, 251
Libya, Libyans, 18, 194
Liebieghaus Museum, Frankfurt, 181
Lipara, 164
Locrians, 39
lotus. *See* aulos
Louvre, 37, 85, 284
Lucania, 18
lute, 236, 283
Lyceum, 9, 294
Lycia, 32
Lydians, 18, 145
lyre, 11, 32, 35–36, 47, 61, 66, 102, 106–7, 123, 127, 132, 142, 147, 153, 155, 160–61, 177, 179, 222, 231, 235–70, 274, 278, 284, 385, 394, 407–11, 436, 450, 457, 474, 476–77, 593, 626, 659, 663
    barbitos (barbiton), 143, 145, 161, 164, 236–37, 249–54, 257, 263, 267, 269, 274, 626
    chelys, 35–36, 70, 212, 236–251, 255, 257, 262–63, 266, 269, 275

  kithara (kitharis), 4, 24, 27, 30, 33, 35–36, 42–44, 47, 55, 59, 61, 66–68, 70, 82, 102, 109–10, 160–61, 194, 222, 236–37, 241, 257–69, 271–72, 283, 436, 450, 457, 474, 476–77, 616
  phorminx, 35, 37, 127–28, 134, 137–38, 178, 234–37, 253–58, 261–63, 265–66, 269, 384
  tortoise-shell. *See* lyre—chelys
lyric, 33, 120, 136

Macedonia, Macedonians, 18, 223
Maedoi, 223
magadis. *See* psalteria
Mantineia, 294
melody, 25, 39, 56, 73, 80, 120, 126, 131, 147, 150, 161, 180, 218, 235–36, 302, 309, 318, 383, 388–90, 483, 537, 539, 541, 577–79, 587, 591, 619, 626, 659, 667
melos, 4, 23–28, 42–44, 47, 55, 60–61, 64, 71, 80, 88–91, 93, 95–96, 98–99, 102–3, 121, 123, 133, 143, 145, 153–55, 160, 184, 223–24, 230–31, 272–73, 300, 303–4, 306–8, 310–11, 314, 318, 324, 327, 332, 337–38, 357, 359–61, 363, 370, 373, 376, 383, 388–89, 410, 416, 418, 463, 483, 501, 518–19, 526, 539, 545, 552, 579, 583, 586–88, 590–91, 612, 659–60, 663, 665–66
membranophone, 159, 162–76, 230, 237, 285
Menidi, 254
Meroë, 191
mese, 244–46, 311–13, 316, 325–26, 330, 350–51, 356–61, 363, 371, 374, 376–77, 379–80, 382–83, 396–98, 401–3, 423–24, 428, 453–54, 459, 461, 464–65, 467, 473–75, 484–85, 490–91, 504, 535, 549–50, 567, 572, 587, 603, 666–67
meter, 25–26, 31–34, 40, 42, 45–46, 57–58, 61–62, 66, 70, 72–73, 90–92, 95, 97–99, 102, 121, 123, 138–39, 148, 157, 167, 272, 540–41, 588, 612, 620–21
metrics, science of, 321, 335, 343, 521, 527, 538, 540–41, 595, 615, 622, 626, 638
Metropolitan Museum, New York City, 170, 220
Milan, 620
mimesis, 271, 538, 544–45, 551, 553, 560, 572, 577
mode, 27, 80, 86, 90, 133, 137–40, 152–53, 452, 533, 535–36, 538, 545, 550–51, 572, 587, 591, 595, 626, 631, 633–34, 641
modulation, 42, 46, 55, 57, 71, 80, 115, 120, 150, 217, 317, 319, 324, 334, 337, 343, 361, 370–72, 387–88, 435, 454, 462, 464, 473, 476–77, 482, 484, 488, 501, 527, 533–35, 537, 540, 578–79, 587–89, 595, 650, 660, 666–67
monochord, 302, 329, 344–45, 349–52, 403, 422, 441–42, 457–58, 504, 555–56, 633–34
  Helicon instrument, 434, 455–56, 523, 555–56
motion, 25, 101, 152, 173, 186–87, 261, 272, 298, 300, 303–8, 317, 337–39, 341, 346–47, 373, 395, 425–26, 436, 479–80, 484, 487, 501, 519, 526, 551–52, 559, 562, 579, 590–91, 614, 659
Murano, 432
Muses, 4, 27, 31, 35, 37, 39, 42, 56–58, 68, 70–71, 76, 82, 123, 133, 138, 164, 179–80, 212, 248, 253–54, 257, 259, 275, 277, 280, 283–84, 554, 623–24, 637
music, ancient Greek
  educational function of, 6–7, 125–26, 222, 234, 248, 253, 257, 525, 541–42, 544, 547, 550, 552–53
  effects on behavior, 6, 8, 131, 160, 286, 483, 545
  effects on character, 6, 8, 286, 525, 541, 543, 546, 577
  methodology in the study of, 13–19

source materials, 2, 3, 5, 7–19, 58, 104–5, 115, 134, 136, 146, 151, 286
  literature, 2–4, 7–11, 13, 15–19, 28, 37, 83, 115, 126, 136, 150–51, 154–55, 157, 159, 163–64, 168, 177, 182, 193, 198–204, 208, 216–18, 220–23, 225–26, 229–31, 233–35, 237–38, 241, 244–47, 251, 253, 267, 270–74, 276, 278–80, 283, 285, 287–668
  graphic and plastic art, 2, 7, 11–13, 16–17, 19, 23, 37, 42, 45, 47, 55, 78, 83, 85, 126–27, 133, 141, 154, 157, 159, 163–66, 168, 171, 174–77, 179, 181, 183, 190, 192, 195–97, 204, 211–12, 218–20, 232–34, 236–43, 247–49, 251–64, 266–67, 269–70, 272, 274–78, 280–86, 289
  archaeological remains, 2, 7, 12, 17, 159, 170, 177, 183, 186–87, 191, 204, 229, 233–34, 237–38, 243, 254, 285, 289
  notated musical compositions, 1, 2, 4, 7–8, 12–13, 16–17, 19, 23, 39–58, 68–71, 78, 85–86, 110–22, 124, 148–51, 155, 157, 163, 169, 288–89, 384, 462, 466, 593, 605–6
theory of, 1, 5, 7–10, 15, 17, 19, 150, 217, 286–668
types of, 6, 8, 18–19, 26–157, 159, 166, 271, 542
  for the gods, 26, 28–94, 107, 110, 126, 129, 135, 139, 142, 147, 159, 179, 222, 253, 258
  for the military, 37, 151–55, 230–34, 546
  for the mortals, 28, 125–58, 251–52, 258
  in the theatre, 5, 11, 94–125, 177, 212, 222, 236, 259, 269
uses of, 6–8, 10–11, 18, 27–29, 55–58, 125–126, 135, 151, 153, 155–57, 159, 177, 222, 248, 257–59, 269–70, 356, 365, 545–47
musical fragments. *See under* music, ancient Greek—source materials—notated musical compositions
musician, ancient Greek, 32–33, 67, 80, 104, 138, 157, 217–18, 257, 261, 270–71, 288, 294, 321–22, 360, 414, 457, 500, 584, 586, 593, 604, 615, 632, 634
Musicians, 515–16
Mycenae, 254
Myrmidons, 254
Mysia, 69
Mytilene, 156

Naiads, 76, 93
Naples, 276
  National Archaeological Museum, 170, 190
Naxos, 17
neo-Platonists, 366, 409, 411–12, 414, 429, 495, 521, 523–26, 543, 582, 616–18, 620, 622–24, 629, 632, 638, 650
Nestorians, 609
Nicaea, 636, 656
Nomimos, 61, 62
nomos, 24–26, 28–29, 43, 58–71, 73–74, 76, 80–81, 95, 145, 157, 178, 274, 545
Normans, 647
notation, Greek musical, 8, 10, 23, 40, 56, 71, 111–13, 115–16, 119–20, 148–50, 215, 286–87, 290, 293, 297, 323, 386, 498–500, 506–9, 530–31, 533–35, 589, 593–98, 600–607, 634, 665
note, 8, 39, 42, 66, 72–73, 89, 104, 113–15, 118–21, 123–24, 161, 185–86, 194, 209–10, 214–16, 218, 223, 241, 244–46, 271, 287, 300–303, 305–17, 319–20, 322–27, 329–33, 337–38, 344–45, 347, 349–52, 359–62, 370–73, 375–77, 379–84, 387–90, 394–96, 398–99, 402–6, 408–10, 416, 418–19, 422–23, 428, 434–43, 445–46, 451, 457–66, 473, 476–78, 480, 484–85,

487–88, 490, 493, 500–501, 503, 505–6, 515, 517–19, 527–28, 530, 532–33, 535, 537–40, 547, 549–52, 562, 564, 571–72, 577–79, 586–87, 589, 591, 595–97, 601–3, 604–5, 616, 627, 632, 641, 659, 665–66

nymph of Cephisus, 64

Nymphs, 107

Nysa, 74

oboe, 202

octochord, 245–46, 398–99, 402

ode, 60–61, 64, 71, 74, 76, 80, 136, 138–41

Olympia, 138, 140

Olympus, 35, 42, 59, 64, 133, 178, 356, 358–59

onomatopoeia, 68, 76–77, 86, 123

orchestra, 74, 92, 94, 97, 101, 108

Orchomenos, 198

organ, 228–29

oschophorika, 28, 88

Ostrogoths, 629

Oxford, 609

paean, 4–5, 26–30, 36–58, 62, 69–71, 81–83, 88–89, 93–94, 103, 107–8, 112–13, 115, 119, 129, 135, 141–42, 145–46, 157, 258–59, 389

paeon epibatos, 72–73

paideia, 234, 269, 364, 537, 542, 545, 548

painting. *See* music, ancient Greek—source materials—graphic and plastic art

pandoura. *See under* psalteria

Pan-pipe. *See* syrinx

papyrus. *See* music, ancient Greek—source materials—notated musical compositions

parakataloge, 72–73, 103

Paris, 609

Parnassus, 42, 47, 623

parodos, 74, 96–99, 101, 103

partheneion, 28, 83–88, 107, 157

Parthenius, Mount 238

Parthenon, 258

Parthia, Parthians, 173–74, 230, 279

pektis. *See under* psalteria

Pelasgians, 87

Pelike, 176

Pelion, 110

Peloponnesian War, 122

Peloponnesus, 18

pentachord, 357

percussion, 11, 161–62, 171, 175–76, 230, 234, 281–82, 285, 346–47, 399, 417, 441, 517
  See also drum, chordophone

performance practice, 16, 18, 159, 177, 204–18, 237, 247, 289, 509, 606

Phliasios, 92

Phoenecia, Phoenicians, 152, 196

phoenix. *See under* psalteria

phorbeia, 218–22, 232

phorminx. *See under* lyre

phrase, 60, 62, 80, 98, 123, 156, 221, 436

Phrygia, Phrygians, 18, 177–78, 194–95

Pierian Olympus, 223

Pieris, 93

Pisa, 138, 140

pitch, 80, 114, 121–22, 159–60, 162, 170–71, 173, 177, 187, 193, 207–9, 211–18, 221, 224–25, 229–30, 232, 235, 237, 242, 245, 248, 250, 264, 273, 284, 300, 302, 304–7, 309, 311–12, 328, 332, 344, 346–47, 357, 360–61, 370–73, 384, 386–88, 390, 396–98, 402–3, 417, 419, 438–40, 442–44, 452, 454–60, 462–63, 466, 478, 501, 506–8, 518–19, 527–28, 530, 533, 598, 600–604, 615, 627, 632, 634, 666–67

planets, 394, 396, 407, 409–10, 428–29, 436, 487–88, 490–93, 568, 570–72

Platonists, 559

plectrum, 35–36, 44, 110, 234–35, 237–38, 247, 251, 260–61, 266, 268, 270, 578
poem, 89–90, 144, 179, 541
poesy, poetry, 7, 28, 33, 66, 75, 78, 88–90, 92, 125, 141, 151–52, 287, 343, 527, 538–39, 541, 577
polychordia, 160, 185, 217
Pompeii, 234
pottery. *See* music, ancient Greek—source materials—graphic and plastic art
prayer, 26, 30, 55–56, 82
prelude, 24, 29, 34, 61, 65, 138
processional, 19, 46, 81
  See also prosodion
prologos, prologue, 70, 95–97
prolongation, 389, 531
prosodion, 28–30, 37, 46–47, 59, 81–83, 94, 157, 184
prosody, 121
protostates. *See* koruphaios
Prytaneum, 144
psalteria, 210, 235–38, 270–86
  Apulian instrument, 270, 280–82, 285
  epigoneion, 236, 270–72
  magadis, 236, 272–75, 278–79
  pandoura, 283–86
  pektis, 145, 160, 236, 272–75, 278
  phoenix, 236, 270, 272–75, 279
  psalterion, 236, 238, 270–72, 275
  sambuke, 161, 236, 253, 270, 273, 275–80
  simikion, 236, 270
  skindapsos, 283–86
  trigonon, 160, 212, 236, 253, 270, 274–80
pycnon, 301, 312–13, 320, 325–26, 331–33, 350, 357, 360, 373, 380–81, 445–48, 452–53, 528, 586, 595
Pythagoreans, 294, 321, 323, 325, 352, 365, 376, 379, 390, 395–96, 405, 415, 426, 435, 438–42, 445, 449, 462, 499, 503, 515–17, 523, 528, 559, 588, 631–32
Pytho, 35, 37, 64, 141

râga, Indian, 63, 65
ratio, 72, 102, 209–10, 225, 229, 312–13, 321, 339–43, 347, 362, 379, 395, 397–405, 408, 416–24, 434–36, 438–44, 446–53, 455–57, 466–67, 474, 477–78, 480, 483–85, 490–91, 503–5, 514–15, 517–19, 539–40, 542, 551, 555, 557, 560, 562, 564, 568, 573–74, 576–77, 588, 615, 632–33, 635, 638, 651, 658–59
Reading University, Museum of Greek Archaeology, 188–89, 192, 205, 207–10, 212, 214
Red Sea, 279
reed, 25, 36, 64, 93, 110, 160, 163, 182–87, 193–208, 210–13, 215–26, 228–29, 231, 238, 240–41
Reggio, 238, 240
Reichenau, 611
repetition, 32, 124, 389–90, 531, 537
responsion, 98, 139–40
Rhegium, 277
Rhodes, 156
rhombos, 163, 172–73
rhoptron, 163, 173–75
rhythm, 8, 23–26, 40–42, 44–46, 62–63, 65, 68–75, 80, 90–92, 95, 98–99, 103–5, 112–15, 117, 119, 121–23, 137, 139–40, 154, 156–57, 166–68, 170, 272, 286–87, 324, 336–42, 414, 501, 538–39, 541, 547–48, 551–52, 572, 578, 587–88, 590, 605, 619–21, 631, 637
rhythmics, science of, 121, 321, 335, 338, 343, 365, 521, 527, 538–39, 541, 585, 589–91, 595, 615, 622, 626, 638, 664
Roman empire, 56
Romans, 55, 155, 231, 234, 547

Rome, 17, 356, 497, 511, 543, 545–46, 607, 629, 636
Roumanian nai, 224–25
Royal Musical Association, 5

St. Michael, monastery, 432
Salamis, 68
salpinx, 153–55, 161, 173–74, 176, 190, 230–34
sambuke. *See under* psalteria
Sangarios river, 224
Sardy, 69
scale, 8, 62–63, 103–5, 123, 157, 193, 209, 221, 235, 244, 287, 300–303, 305–7, 317–20, 324, 326–27, 329–30, 333, 337–38, 357, 362, 370–72, 378–81, 382–85, 388, 397–99, 402, 404–5, 411, 419, 428, 437, 443, 458–60, 462, 473–74, 477–78, 490, 493, 501–2, 504–5, 527–28, 530–32, 535, 537, 539, 547, 549–50, 557, 560, 562–63, 566–67, 586–87, 589, 595, 615, 632, 650, 657–60
Scythians, 194
seistron, 163, 172–73, 237, 281
Seleucia, 649
Seljuqs, 646–47
semitone, 225, 230, 244, 331, 373, 375, 377, 379, 383, 388, 399, 402, 405, 416, 418, 420, 428, 435, 460, 463–64, 476, 503–4, 507–8, 504, 506, 508, 528–29, 534–35, 555, 563–64, 586–88, 597–98, 601, 604, 627, 641
Senate, 497
sequence, 150, 209, 315, 317, 327, 358, 371, 389–90, 422, 435, 459–60, 488–89, 528, 531, 537, 572, 578, 666
Seriphos, 64
Sicily, 279, 511
sikinnis, 101, 252
sillos, 28, 125, 141–51
singer, 23, 31, 34, 37, 44, 78, 96, 100, 103, 114, 118, 133, 137–38, 141–42, 145, 235, 267, 589
skindapsos. *See* psalteria
skolion, 28, 123, 125, 141–51
slapsticks, 163
Smyrna, 148, 412
song, 23–26, 31, 34–39, 42, 47, 55, 58, 60, 68, 70–73, 80, 84, 86, 88, 91, 93, 95, 99–100, 103, 107, 123, 128, 133, 135, 138–40, 142–46, 151–52, 154–57, 160, 170, 235, 260, 272, 551, 603, 623, 626, 631
  drinking, 23, 141–47
  folk, 152, 155–57
  love, 23, 126, 151–53, 157
  wedding, 23, 131, 157
  work, 23, 125, 151, 157
sound, 12, 25, 43, 62, 69, 76–77, 86, 93, 109–10, 133, 138, 145, 149, 159–60, 162–64, 167, 170–74, 185–86, 191, 193, 200–201, 203–4, 212, 214–17, 221, 223, 228–33, 237, 250, 259, 267, 271–73, 280, 286, 298, 305–6, 346–47, 395, 397, 403–5, 407, 410–11, 416–19, 421, 428, 434, 436–39, 443, 488, 500, 502, 514, 517–18, 526, 539–40, 549, 554, 562, 569–70, 581, 590, 611, 618, 620–21, 632, 635, 638, 663
Spain, 609, 617
Sparta, Spartans, 38, 59, 67, 70, 74, 88, 153–55, 231
species, 30, 92, 96, 104–5, 299, 303, 309–10, 320, 326, 330, 332–34, 378–81, 394, 399, 407, 409, 434–35, 438, 458–60, 463–65, 480, 486, 505–6, 530–31, 565, 586–88, 591, 634, 659
sphragis, 63, 68, 70
spondeiasmos, 357–59, 460, 537
stasimon, 74, 95, 97, 99, 101–2
statuary. *See* music, ancient Greek—source materials—graphic and plastic art
Stoics, 479
stone. *See* music, ancient Greek—source materials—graphic and plastic art

string, 36, 61, 66–68, 90, 138, 210, 215, 235–48, 250–51, 256–57, 261–64, 267–68, 270, 273, 275–80, 282–85, 304, 346–47, 383, 394, 399, 403–4, 407–11, 418, 421–22, 435, 441–42, 444, 456–58, 466, 476–78, 518, 554–55, 617, 635, 659
strophe, 33, 65–66, 76–77, 85–86, 98–99, 108–9, 129, 137–40, 541
style, 24, 26, 29, 60, 62, 66–73, 75, 80, 85, 90, 92, 94, 99, 101–2, 104–6, 110, 116, 120–24, 134, 136, 139, 145, 148, 155, 201, 217, 221, 271, 278, 356–57, 359–60, 362, 365, 384–85, 494
succession, 150, 333, 371, 389–90, 531, 537
Susa, 69
syllable, 40, 42, 45–46, 75, 82, 112–15, 118–21, 123–24, 139, 149, 154, 232, 309, 337–39, 539–40, 550, 552, 588, 590, 665
Syracuse, 141, 145, 279
syrinx, 110, 128, 176–79, 195, 210, 213–17, 222–26, 229, 274, 403, 441, 457, 515

Talmud, 131
tambourine, 174
Tarentum, 294, 395
Tartarus, 623
tempo, 166, 168, 286, 340–41, 343–44, 540, 587
Teos, 44
tetrachord, 244–46, 301, 311–12, 315–17, 320, 325–27, 329–32, 344–45, 350, 357, 359–61, 363, 375, 378–79, 382–83, 396, 398, 402–5, 407, 409–11, 418, 435–37, 444, 446–48, 450–54, 462, 474, 476, 484, 487, 489–90, 537, 549–50, 567, 571, 586–90, 596–97, 601, 627, 632, 634, 659–60, 666–67
theatre. *See* music, ancient Greek—types of
Thebans, 88, 184, 194
Thebes, 76, 87
theme, 63, 125
Thera, 17
thesis. *See* arsis and thesis
Thessalia, 18
Thrace, Thracians, 18, 177
threnos, threnody, 23, 28, 38, 125, 131–36, 195
timbre, 159, 177, 204, 211–12, 215, 221, 225, 237, 397
timpana, 76
tone, 42, 47, 55, 73, 76, 106, 172, 186, 196, 208, 210–12, 215, 222, 224, 230, 236–37, 244–45, 300, 305, 311–12, 315–16, 320, 322, 325, 327–32, 340, 349–51, 357–58, 375–89, 398–99, 402, 405, 408, 416, 418–21, 423, 428, 435, 440–44, 447, 450–51, 453–54, 456, 459–62, 464–67, 473–74, 476, 478, 484–86, 490, 493, 502–6, 518, 528–29, 531–32, 534–35, 550, 555, 560, 563–64, 570, 584, 586–88, 590–91, 593, 598, 601–4, 617, 627, 633–34, 641, 650
tonos, 42, 55, 57, 65, 71, 80, 83, 86, 103–5, 115, 120, 137, 150, 157, 301–3, 318–19, 322, 334, 337, 370–72, 381, 384–88, 395, 407, 409–10, 432, 435–37, 443, 451, 455–66, 473–77, 482–84, 487–89, 501, 506–9, 522, 527–28, 530–31, 533–35, 537, 540, 564, 572, 583, 589, 594–98, 601–5, 615–16, 627, 634, 638–39, 650, 657–59, 663, 665–67
treatises. *See* music, ancient Greek—source materials—literature
trigonon. *See under* psalteria
Troglodytes, 279
Trojans, 178
tropos. *See* tonos
trumpet, 106, 232
tumpana, 173–75
tuning, 61–63, 65, 159, 171, 177, 197, 207, 225, 229, 237, 242–47, 257, 263–64, 275, 285, 302, 361, 383, 395, 397–

98, 402, 429, 450–52, 454, 457, 460, 464, 472–74, 476, 593
Twelve Tables, 131, 132
Tyre, 511

University of California at Irvine, 11

vase. *See* music, ancient Greek—source materials—graphic and plastic art
Vivarium, 636, 639
voice, 35, 47, 55, 107, 138, 142, 160, 163, 186, 215, 229–30, 261, 285, 300, 302, 304–11, 315, 317–18, 324–25, 370, 372, 384–85, 387, 394–95, 418–19, 439, 445, 500–502, 514, 520, 528, 533, 537, 587, 591, 603, 632, 659, 665–66
vowel, 40, 42, 45, 86, 93, 112, 117, 120, 124, 149, 191, 410, 549, 577–78

Western empire, 497
whistle, 214, 222
windpipe, 518, 520

xylophone, 237, 281–82

Yugoslavia, 18

Zephyr, 86
Zephyrion, 39
zither, 236
zodiac, 411, 484–87, 489–93, 564, 570–73, 614